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Distribution, Abundance, and Breeding Activities of the Southwestern Willow Flycatcher at Marine Corps Base Camp Pendleton, California

2004 Annual Report

Prepared for:

Assistant Chief of Staff, Environmental Security
U.S. Marine Corps Base Camp Pendleton

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
WESTERN ECOLOGICAL RESEARCH CENTER

Distribution, Abundance, and Breeding Activities of the Southwestern Willow Flycatcher at Marine Corps Base Camp Pendleton, California

By Barbara E. Kus and Kerry E. Kenwood

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Cover photographs by Suzanne Langridge (left) and Jay Rourke (right)

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TABLE OF CONTENTS

LIST OF TABLES

TABLE OF CONTENTS
(*continued*)

LIST OF TABLES
(*continued*)

LIST OF FIGURES

TABLE OF CONTENTS
(*continued*)

LIST OF FIGURES
(*continued*)

LIST OF APPENDICES

EXECUTIVE SUMMARY

Surveys for the endangered southwestern willow flycatcher (*Empidonax traillii extimus*) were conducted at Marine Corps Base Camp Pendleton, California, between 15 May and 15 August 2004. Eighty-two transient flycatchers of unknown subspecies were detected during surveys. Transients occurred in a range of habitat types including mixed willow riparian, willow-sycamore dominated riparian, oak-sycamore dominated riparian, riparian scrub, and upland scrub. The distance from transient locations to the nearest surface water averaged 274 ± 374 m (N = 72).

Twenty-five southwestern willow flycatcher territories were located. With the exception of one territory at Lake O'Neill on Fallbrook Creek and one territory upstream of Basilone Road on Las Flores Creek, all territories were along the Santa Margarita River. All territories were located in mixed willow riparian habitat except three in riparian scrub. Exotic vegetation, particularly poison hemlock (*Conium maculatum*), giant reed (*Arundo donax*), and tamarisk (*Tamarix ramosissima*), was present in all territories, and was dominant (% cover > 50) in 4% (1/26) of territories. Twenty-seven percent of resident flycatchers were within 85 m of surface water, and the remainder greater than 100 m away from it.

The resident flycatcher population included two non-territorial "floater" birds, three unpaired males, and 22 pairs. Nesting was documented for all 22 pairs, which produced 1-3 nests each. Fifty-two percent (16/31) of nests were successful, and flycatchers fledged an average of 1.8 young per pair. No instances of cowbird parasitism were observed. Pairs placed nests in eight species of plants, including black willow *(Salix gooddingii*), arroyo willow (*S. lasiolepis*), sandbar willow (*S. exigua*), mule fat (*Baccharis salicifolia*), stinging nettle (*Urtica dioica*), poison hemlock, giant reed, and poison oak (*Toxicodendron diversilobum*).

Ten resident males and 17 females present in 2004 were banded previously at Camp Pendleton or off-Base at the San Luis Rey River between 2000 and 2003. Fifty-six percent (18/32) of the banded adults present at the Base in 2003 returned in 2004; of these, 28% moved to different breeding areas than those occupied the previous year. Fifteen percent of nestlings (5/34) banded in 2003 returned to the Base as adults in 2004. Five resident males and three females were captured and color banded in 2004, and 42 nestlings in 17 nests were banded. None of the transients observed during surveys were seen to carry bands.

INTRODUCTION

The southwestern willow flycatcher (*Empidonax traillii extimus*) is one of four subspecies of willow flycatcher in the United States, with a breeding range including southern California, Arizona, New Mexico, extreme southern portions of Nevada and Utah, and western Texas (Hubbard 1987, Unitt 1987). Restricted to riparian habitat for breeding, the southwestern willow flycatcher has declined in recent decades in response to widespread habitat loss throughout its range and, possibly, cowbird parasitism (Wheelock 1912; Willett 1912, 1933; Grinnell and Miller 1944; Remson 1978; Garrett and Dunn 1981; Unitt 1984, 1987; Gaines 1988; Schlorff 1990; Whitfield and Sogge 1999). By 1993, the species was believed to number approximately 70 pairs in California (USFWS 1993) in small disjunct populations. The southwestern willow flycatcher was listed as endangered by the State of California in 1992 and by the U.S. Fish and Wildlife Service in 1995.

Willow flycatchers in southern California co-occur with the least Bell's vireo *(Vireo bellii pusillus*), another riparian obligate endangered by habitat loss and cowbird parasitism. However, unlike the vireo, which has increased six-fold since the mid-1980's in response to management alleviating these threats (USGS Western Ecological Research Center, San Diego Field Station unpubl. data), willow flycatcher numbers have remained low. Currently, the majority of southwestern willow flycatchers in California are concentrated in three sites: the South Fork of the Kern River in Kern County (Whitfield and Cohen 2003), the Upper San Luis Rey River, including a portion of the Cleveland National Forest in San Diego County (Varanus Biological Services 2001), and Marine Corps Base Camp Pendleton in San Diego County (Kus and Kenwood 2005). Outside of these sites, southwestern willow flycatchers occur as small, isolated populations of one to half a dozen pairs. Data on the distribution and demography of the flycatcher, as well as identification of factors limiting the species, are critical information needs during the current stage of recovery planning (Kus *et al*. 2003).

The purpose of this study was to document the status of southwestern willow flycatchers at Marine Corps Base Camp Pendleton in San Diego County, California. Specifically, our goals were to (1) determine the size and composition of the willow flycatcher population at the Base, (2) document survivorship and movement of resident flycatchers, (3) document nesting activities, and (4) characterize habitat used by flycatchers. These data, when combined with data from other years, will inform natural resource managers about the status of this endangered species at Camp Pendleton, and guide modification of land use and management practices as appropriate to ensure the species' continued existence.

This work was funded by the Assistant Chief of Staff, Environmental Security, Resources Management Division, Marine Corps Base Camp Pendleton, California.

STUDY AREAS AND METHODS

Field Surveys

All of Camp Pendleton's major drainages, and several minor ones supporting riparian habitat, were surveyed for flycatchers between 15 May and 31 July 2004. Field work was conducted by Bob Chapman, Dan Evans, Dana Kamada, Kerry Kenwood, Barbara Kus, Jay Rourke, and Mike Wellik. The specific areas surveyed are as follows:

Santa Margarita River: between Stuart Mesa Road and the Base boundary, including Ysidora Basin and Stagecoach Canyon (Figures 1, 2).

De Luz Creek: between the confluence with the Santa Margarita River and the Base boundary (Figure 1).

Roblar Creek: from the confluence with De Luz Creek to a point approximately 1 km upstream (Figure 1).

Fallbrook Creek: between Lake O'Neill and the Base boundary (Figure 1).

Las Flores Creek: between the Pacific Ocean and a point approximately 75 m upstream of Basilone Road (Figure 5).

Cockleburr Canyon: between the Pacific Ocean and Interstate 5 (Figure 2).

Horno Canyon: between Old Highway 101 and the upstream limit of riparian habitat (Figure 5).

Piedra de Lumbre Canyon: between the confluence with Las Flores Creek and the upstream limit of riparian habitat (Figure 5).

French Creek: between the Pacific Ocean and the Edson Range Impact Area (Figure 2).

Aliso Creek: between the Pacific Ocean and 0.5 km upstream of the electrical transmission lines (Figure 2).

Newton Canyon: between the confluence with the Santa Margarita River and the upstream limit of riparian habitat (Figure 2).

San Onofre Creek: between the Pacific Ocean and the access road to Range 219 (Figures 3, 4).

San Mateo Creek: between the Pacific Ocean and the Base boundary, including habitat south of the creek, and south and east of the agricultural fields (Figures 3, 4).

Cristianitos Creek: between the confluence with San Mateo Creek and the Base boundary (Figure 3).

Pilgrim Creek: between the Base boundary and the limit of habitat upstream of Sewage Treatment Plant 1, including two side drainages between Pilgrim Creek and the southern Base boundary (Figure 6).

Windmill Canyon: from the Base boundary to the golf course entrance (Figure 6).

Drainages were surveyed at least once during each of four consecutive survey periods between 15 May and 31 July. The first period extended from 15 May through 31 May, the second period from 1 June through 21 June, the third from 22 June through 14 July, and the fourth from 15 July through 31 July.

Investigators followed standard survey protocol (Sogge *et al.* 1997), moving slowly (approximately 2 km per hour) through the riparian habitat while searching and listening for willow flycatchers. Observers walked along the edge(s) of the riparian corridor on the upland and/or river side where habitat was narrow enough to detect a bird on the opposite edge. In wider stands, observers traversed the habitat choosing routes that permitted detection of all birds throughout its extent. Surveys were conducted between dawn and early afternoon, depending on wind and weather conditions.

For each bird encountered, investigators recorded age (adult or juvenile), breeding status (paired, unpaired or transient), and whether the bird was banded. Flycatcher locations were mapped on 1":12,000" aerial photographs as well as 1":24,000" USGS topographic maps, using a Garmin 12 Global Positioning System (GPS) unit with 1-15 m positioning accuracy to determine geographic coordinates (WSG84). Territories were delineated by connecting the outmost perches used by flycatchers. Distance to the nearest surface water was recorded for each location, and habitat type specified according to the following categories based on dominant vegetation:

Mixed willow riparian: Habitat dominated by one or more willow species including *Salix gooddingii, S. lasiolepis,* and *S. laevigata,* with *Baccharis salicifolia* as a frequent co-dominant.

Willow-cottonwood: Willow riparian habitat in which *Populus fremontii* is a co-dominant.

Willow-sycamore: Willow riparian habitat in which *Platanus racemosa* is a co-dominant.

Sycamore-oak: Woodlands in which *P. racemosa* and *Quercus agrifolia* occur as co-dominants.

Riparian scrub: Dry and/or sandy habitat dominated by *S. exigua* or *B. salicifolia,* with few other species.

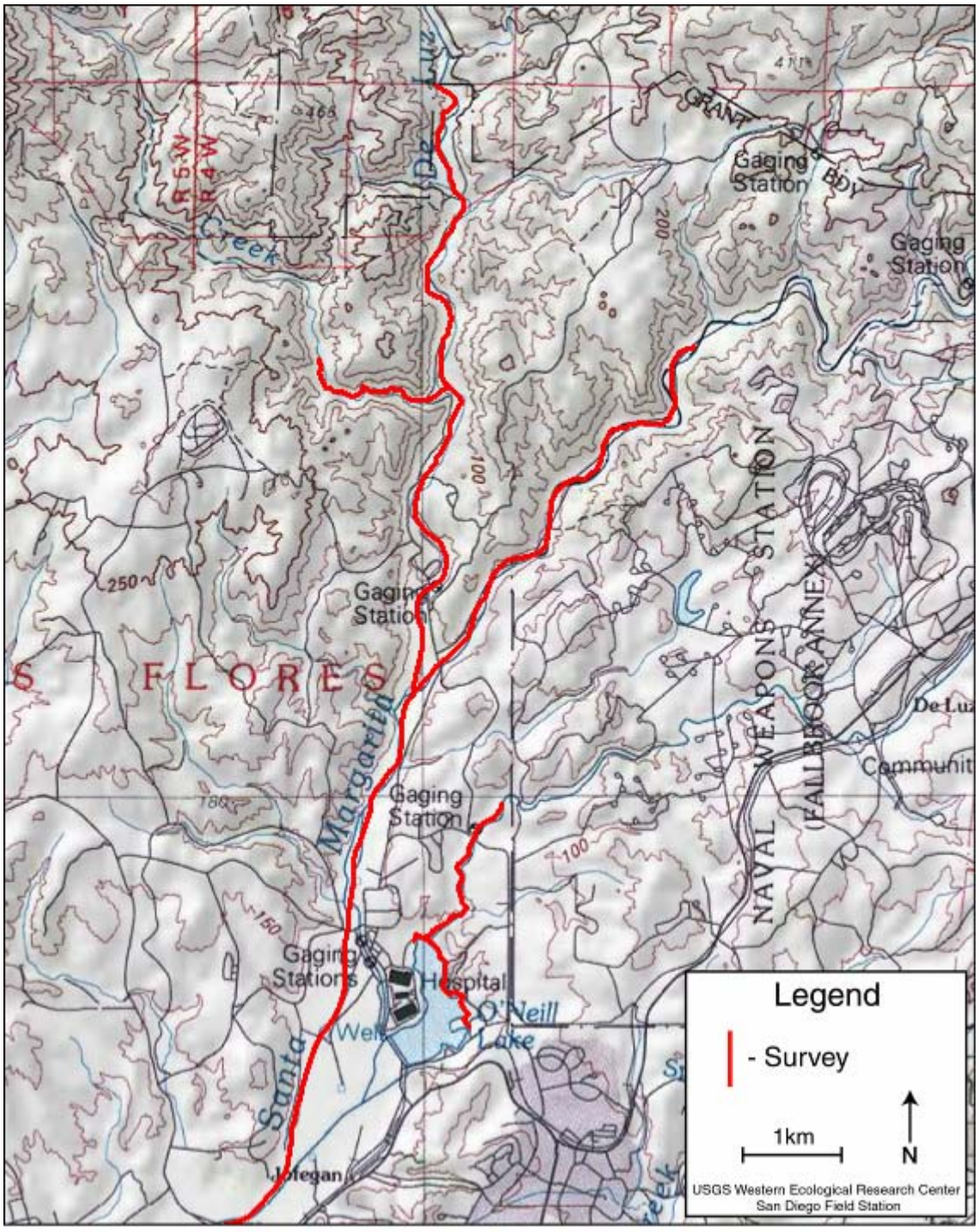

Figure 1. Willow flycatcher survey areas at Marine Corps Base Camp Pendleton, 2004: Santa Margarita River, Fallbrook Creek, De Luz Creek and Roblar Creek

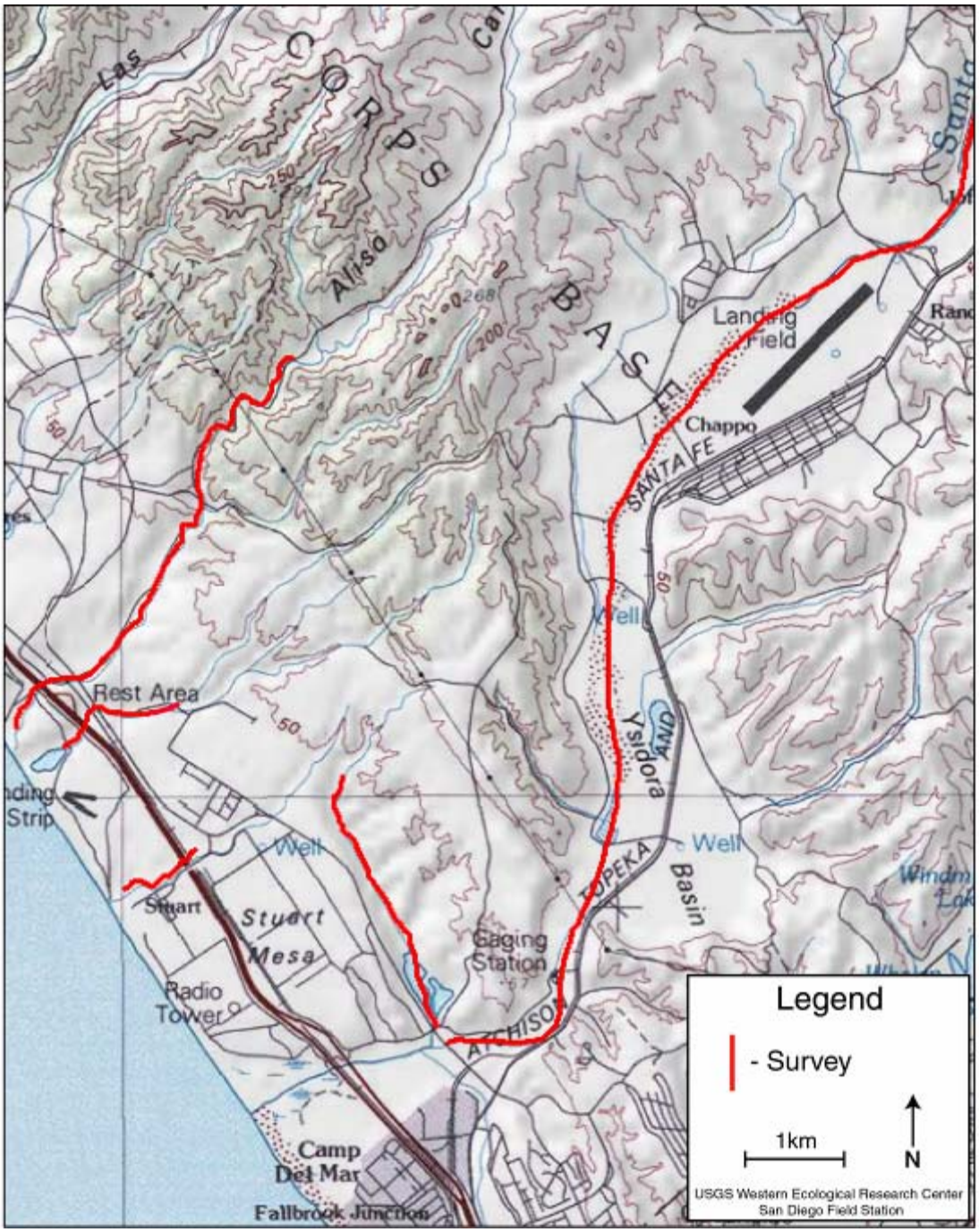

Figure 2. Willow flycatcher survey areas at Marine Corps Base Camp Pendleton, 2004: Santa Margarita River, Newton Canyon, Cockleburr Canyon, French Creek, and Aliso Creek

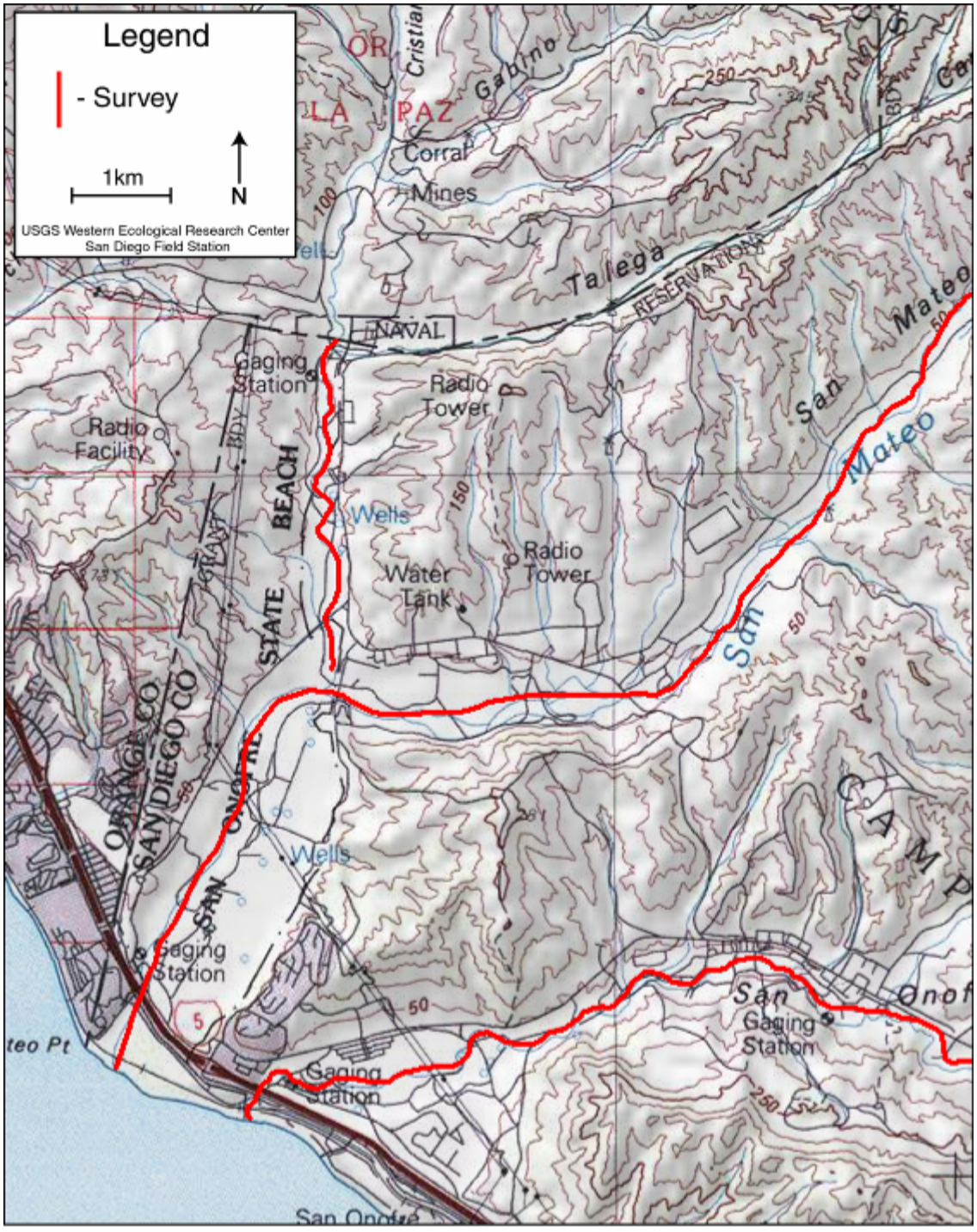

Figure 3. Willow flycatcher survey areas at Marine Corps Base Camp Pendleton, 2004: Cristianitos Creek, San Mateo Creek and San Onofre Creek

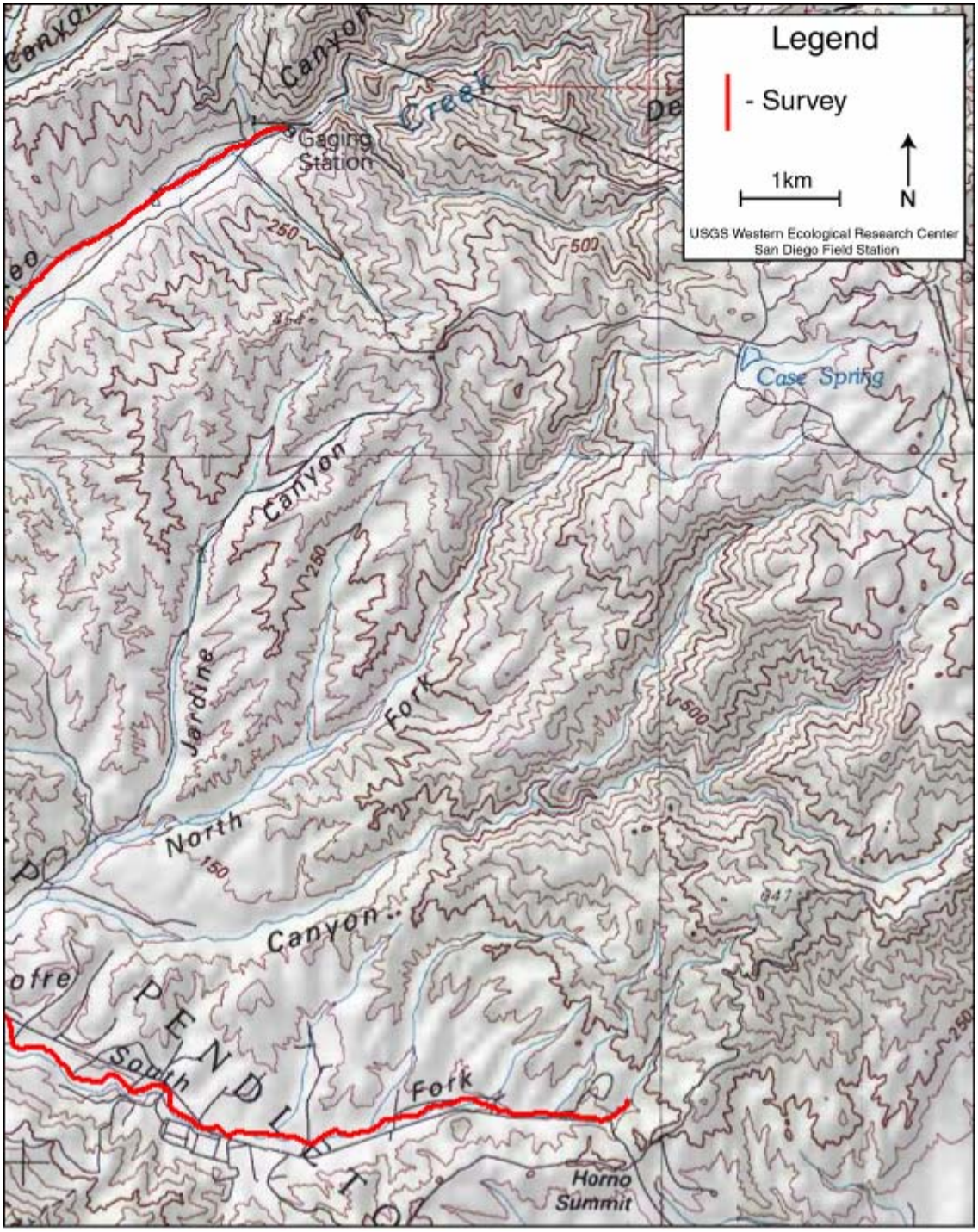

Figure 4. Willow flycatcher survey areas at Marine Corps Base Camp Pendleton, 2004: San Mateo Creek and San Onofre Creek

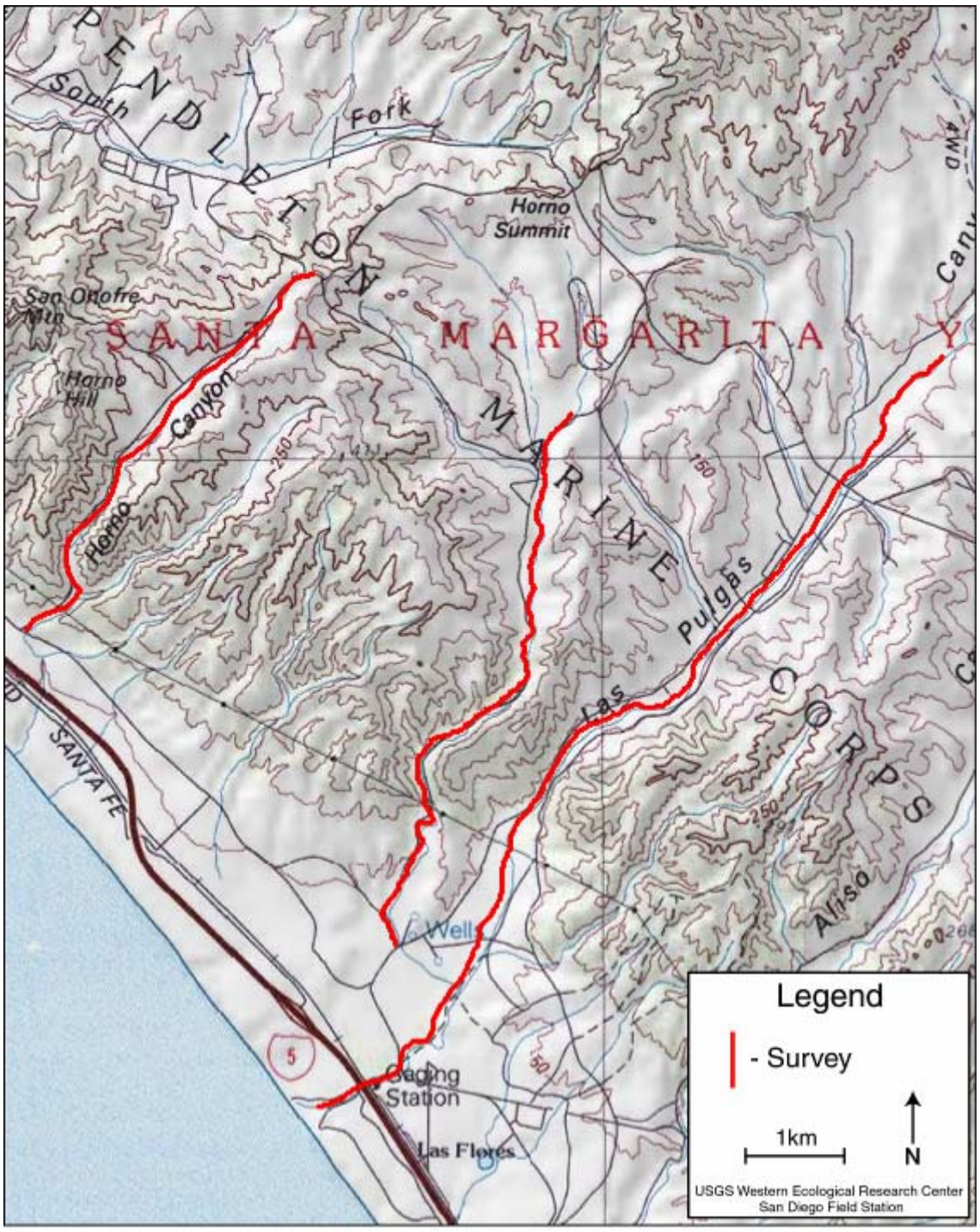

Figure 5. Willow flycatcher survey areas at Marine Corps Base Camp Pendleton, 2004: Las Flores Creek, Piedra de Lumbre Canyon, and Horno Canyon

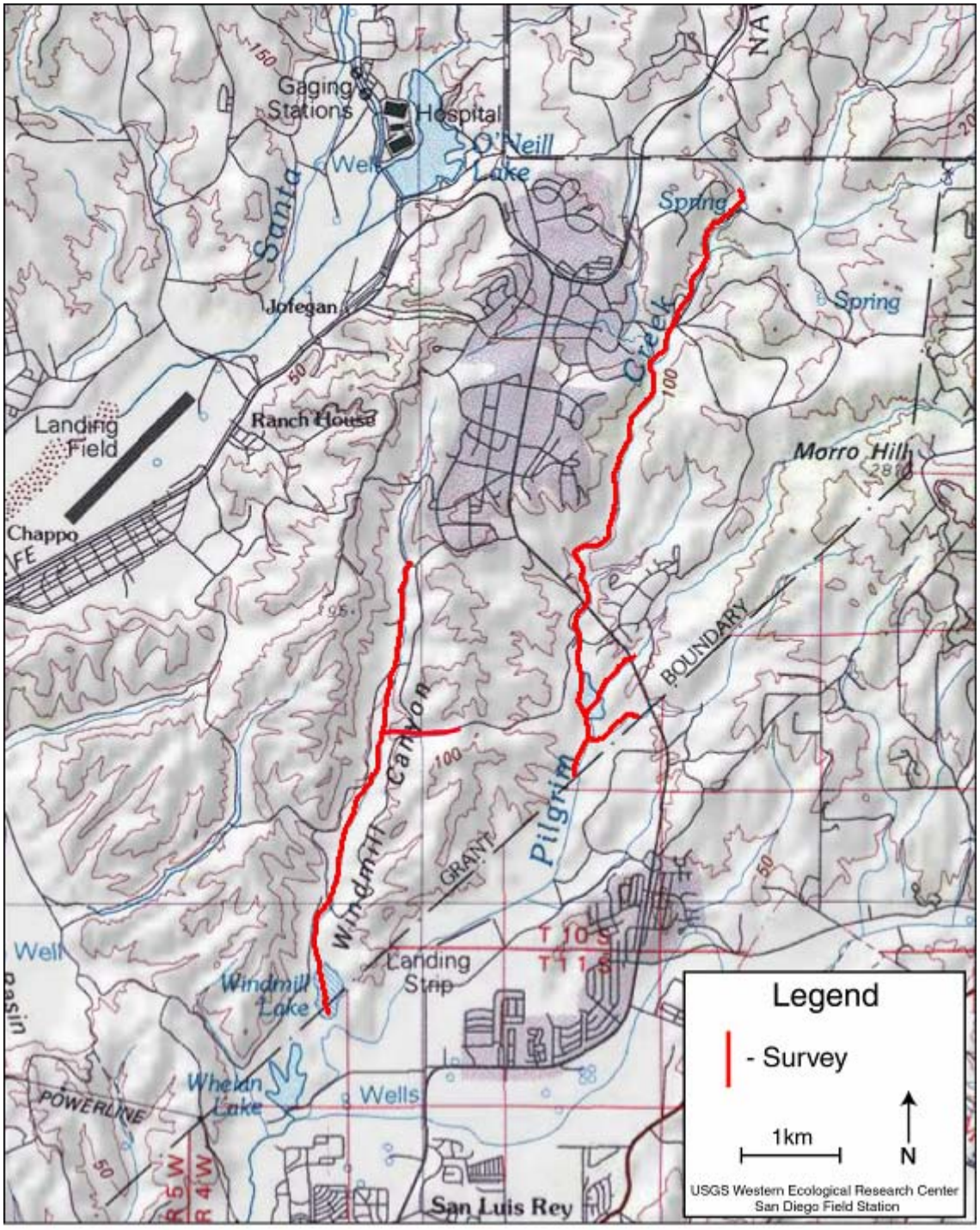

Figure 6. Willow flycatcher survey areas at Marine Corps Base Camp Pendleton, 2004: Windmill Canyon and Pilgrim Creek

Upland scrub: Disturbed coastal sage scrub adjacent to riparian habitat.

Non-native: Sites vegetated exclusively with non-native species such as *Arundo donax* and *Tamarix ramosissima*.

Percent cover of exotic vegetation at each location was estimated using cover categories of <5%, 5-50%, and > 50%, and the dominant exotic species recorded.

Nest Monitoring

Pairs were observed for evidence of nesting, and nests located and monitored following standard protocol (Rourke *et al.* 1999). Nests were visited as infrequently as possible to minimize the chances of leading predators or brown-headed cowbirds (*Molothrus ater*) to nest sites; typically, there were four to six visits per nest. The first visit was timed to determine the number of eggs laid, the next few visits to determine hatching and age of young, the next to band nestlings, and the last to confirm fledging. Characteristics of nests, including height, host species, and host height were recorded following abandonment or fledging of nests.

Banding

Nestlings were banded at 7-10 days of age. Each bird received a non-anodized aluminum federal numbered band on one leg. Unbanded adults were captured in mist nets within their territories, and were banded with either a numbered federal band (anodized dark green) on one leg and a bi-colored metal band on the other, or simply just a painted numbered federal band on one leg.

RESULTS

Population Size and Distribution

Transients

Eighty willow flycatchers of unknown sub-species were observed during Base-wide surveys, and an additional two were captured in mist nets at the MAPS (Monitoring Avian Productivity and Survival) station operated at the lower Santa Margarita River (Kus *et al.* in prep; Figures 7-15). All transients were detected between 18 May and 18 June. Transients occurred on every drainage surveyed except Cristianitos, Aliso, French, Newton, De Luz, and Roblar Creeks.

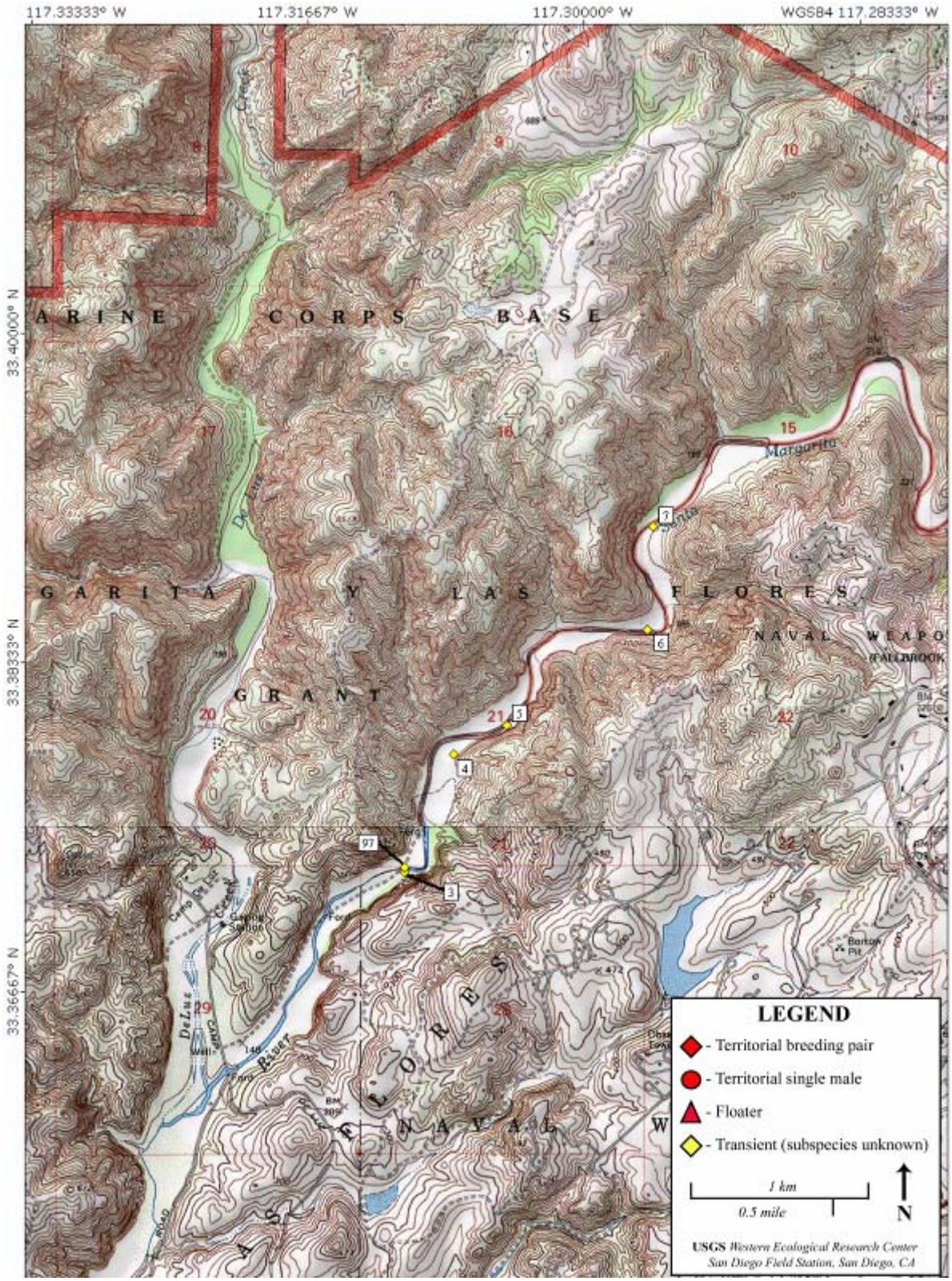

Figure 7. Locations of willow flycatchers at Marine Corps Base Camp Pendleton, 2004: Santa Margarita River (upstream) and De Luz Creek

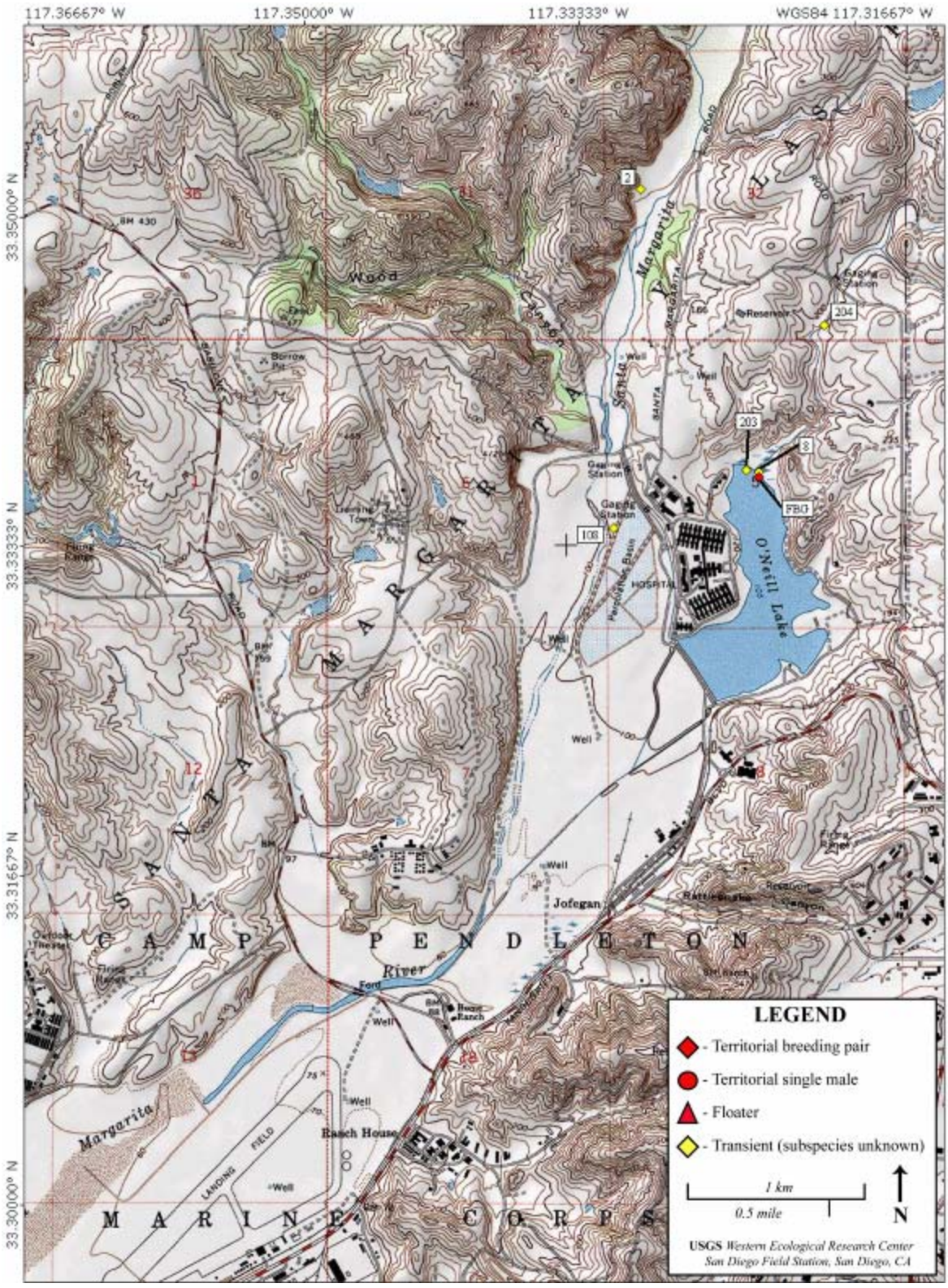

Figure 8. Locations of willow flycatchers at Marine Corps Base Camp Pendleton, 2004: Santa Margarita River and Fallbrook Creek

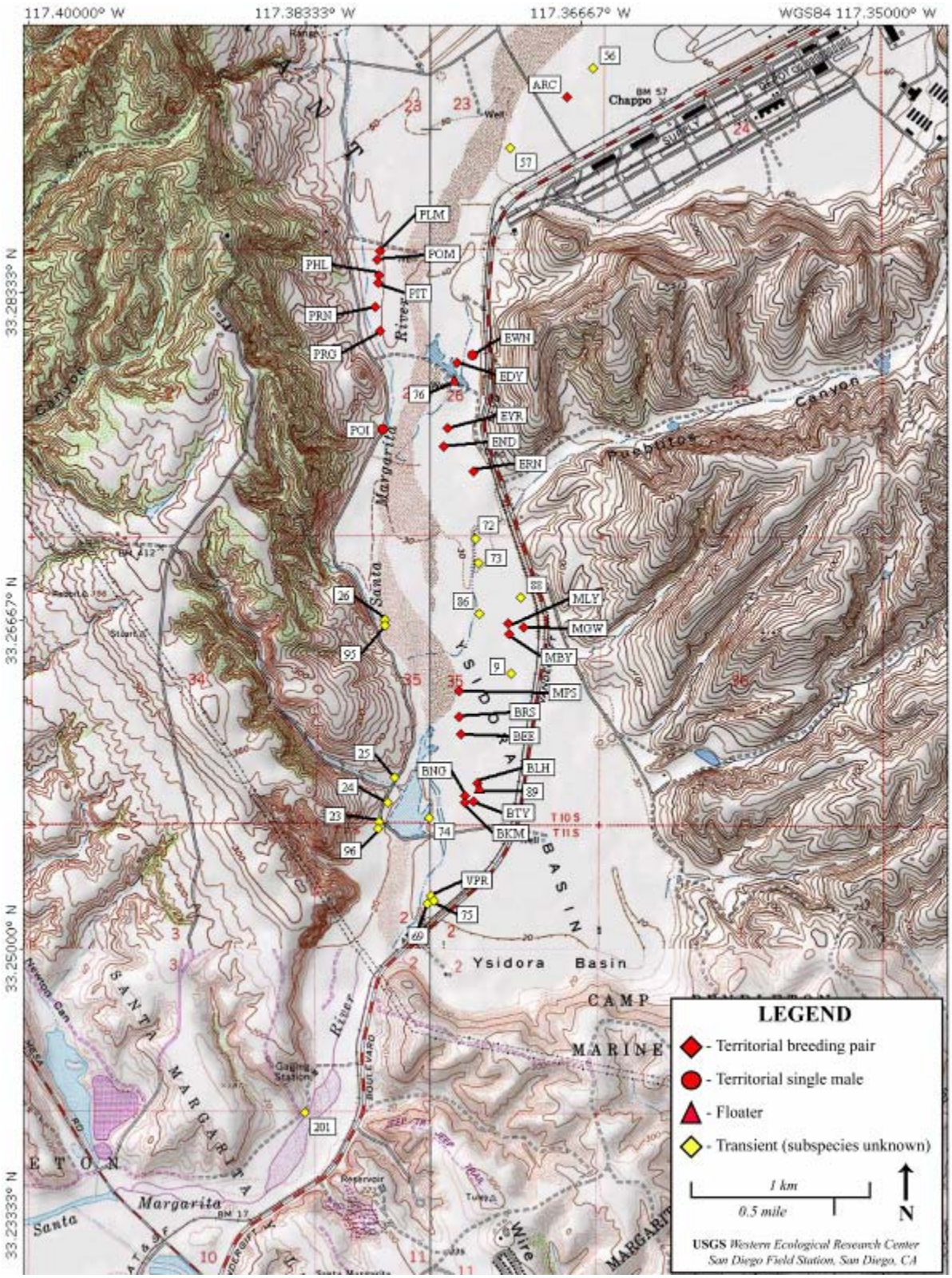

Figure 9. Locations of willow flycatchers at Marine Corps Base Camp Pendleton, 2004: Santa Margarita River (downstream)

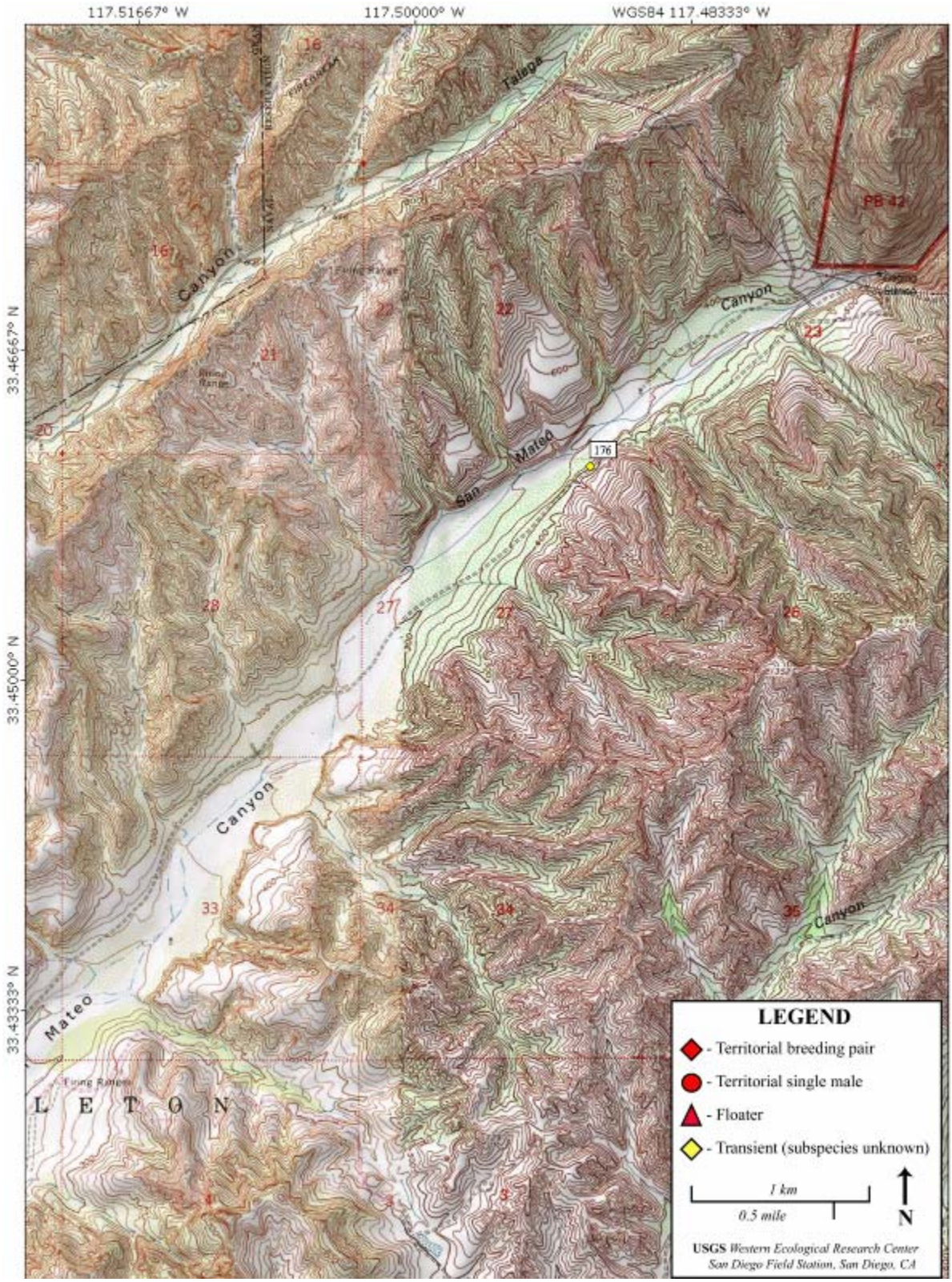

Figure 10. Locations of willow flycatchers at Marine Corps Base Camp Pendleton, 2004: San Mateo Creek (upstream)

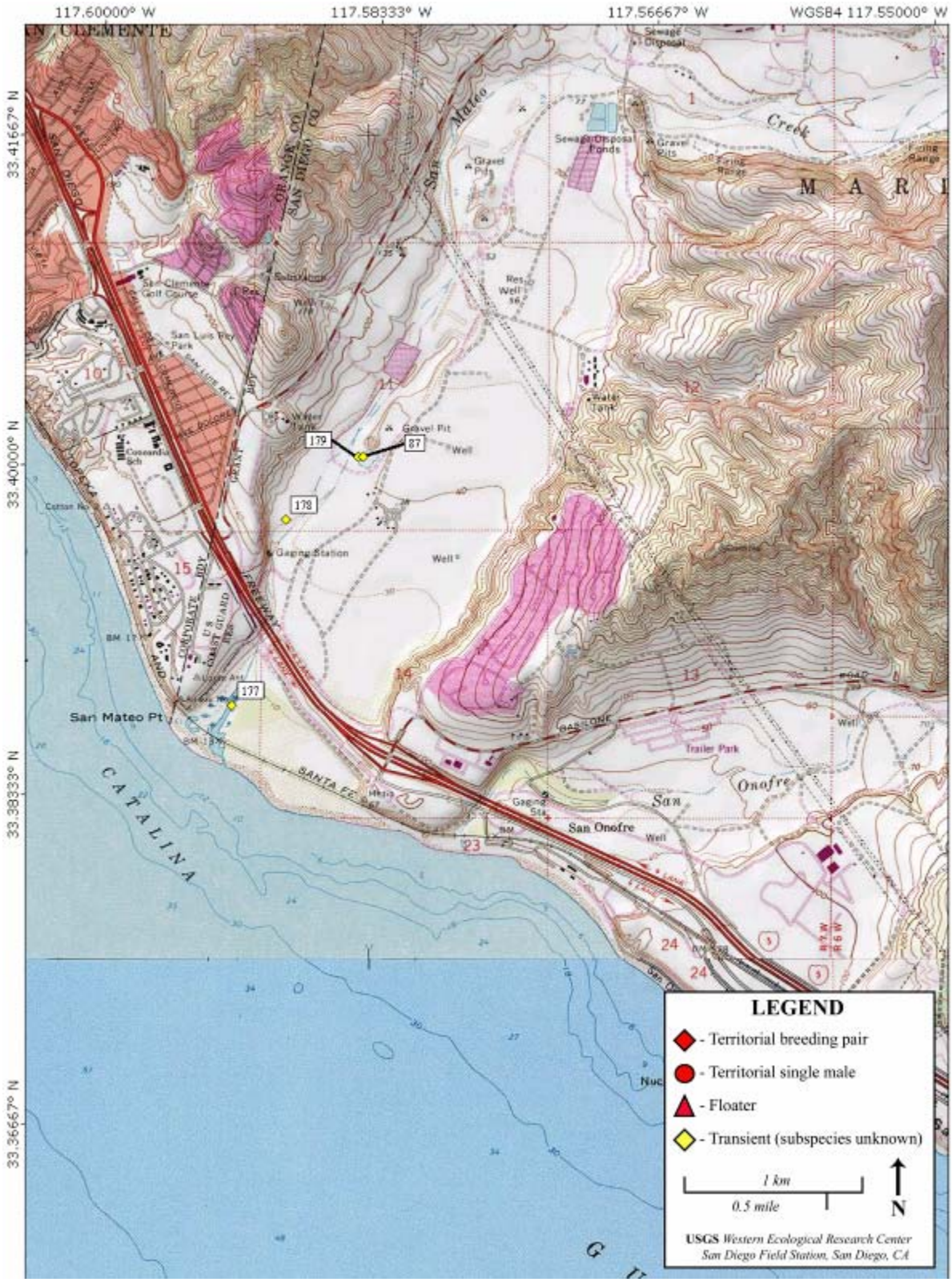

Figure 11. Locations of willow flycatchers at Marine Corps Base Camp Pendleton, 2004: San Mateo Creek (downstream)

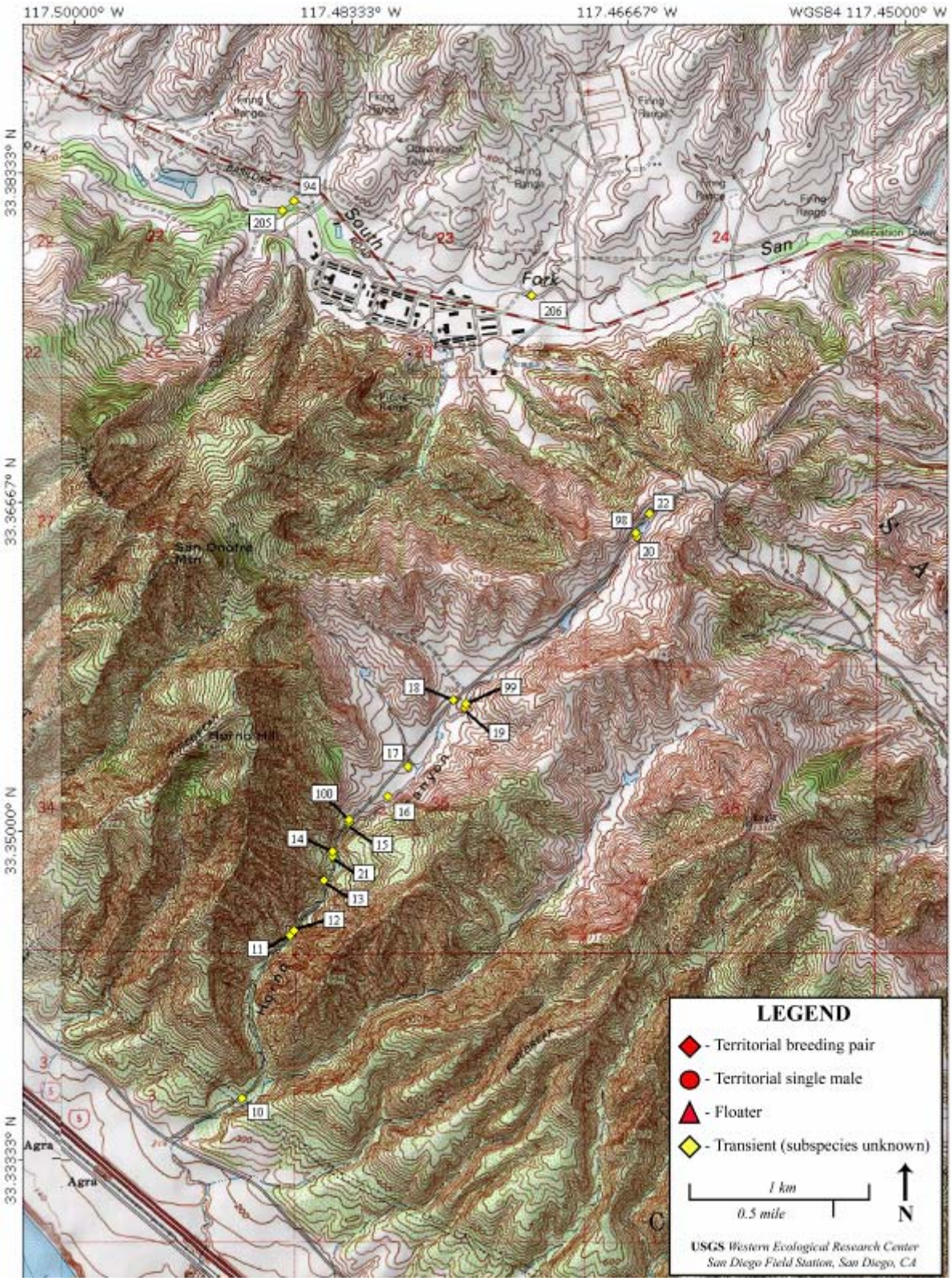

Figure 12. Locations of willow flycatchers at Marine Corps Base Camp Pendleton, 2004: San Onofre Creek and Horno Canyon

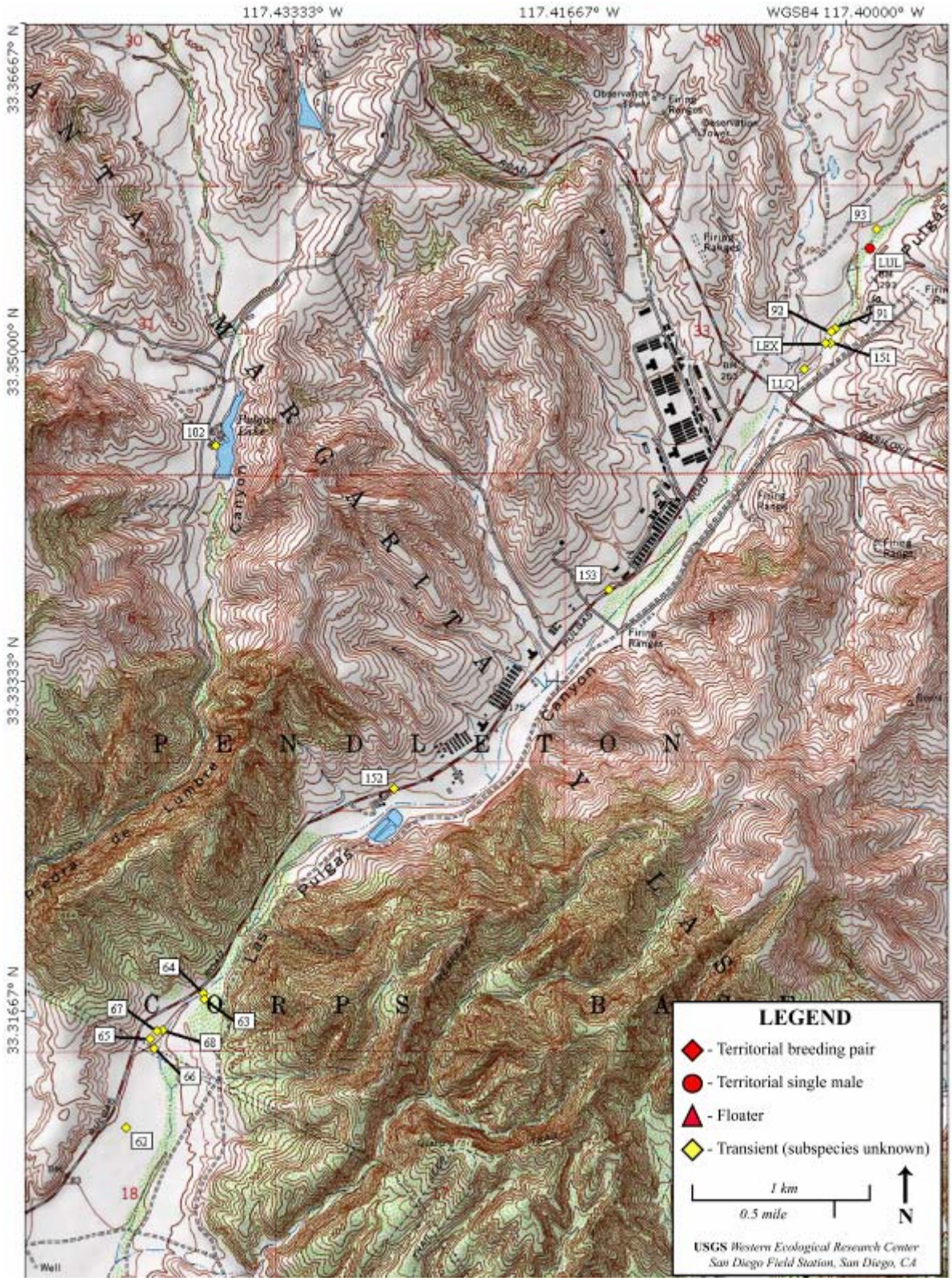

Figure 13. Locations of willow flycatchers at Marine Corps Base Camp Pendleton, 2004: Piedra de Lumbre Canyon and Las Flores Creek

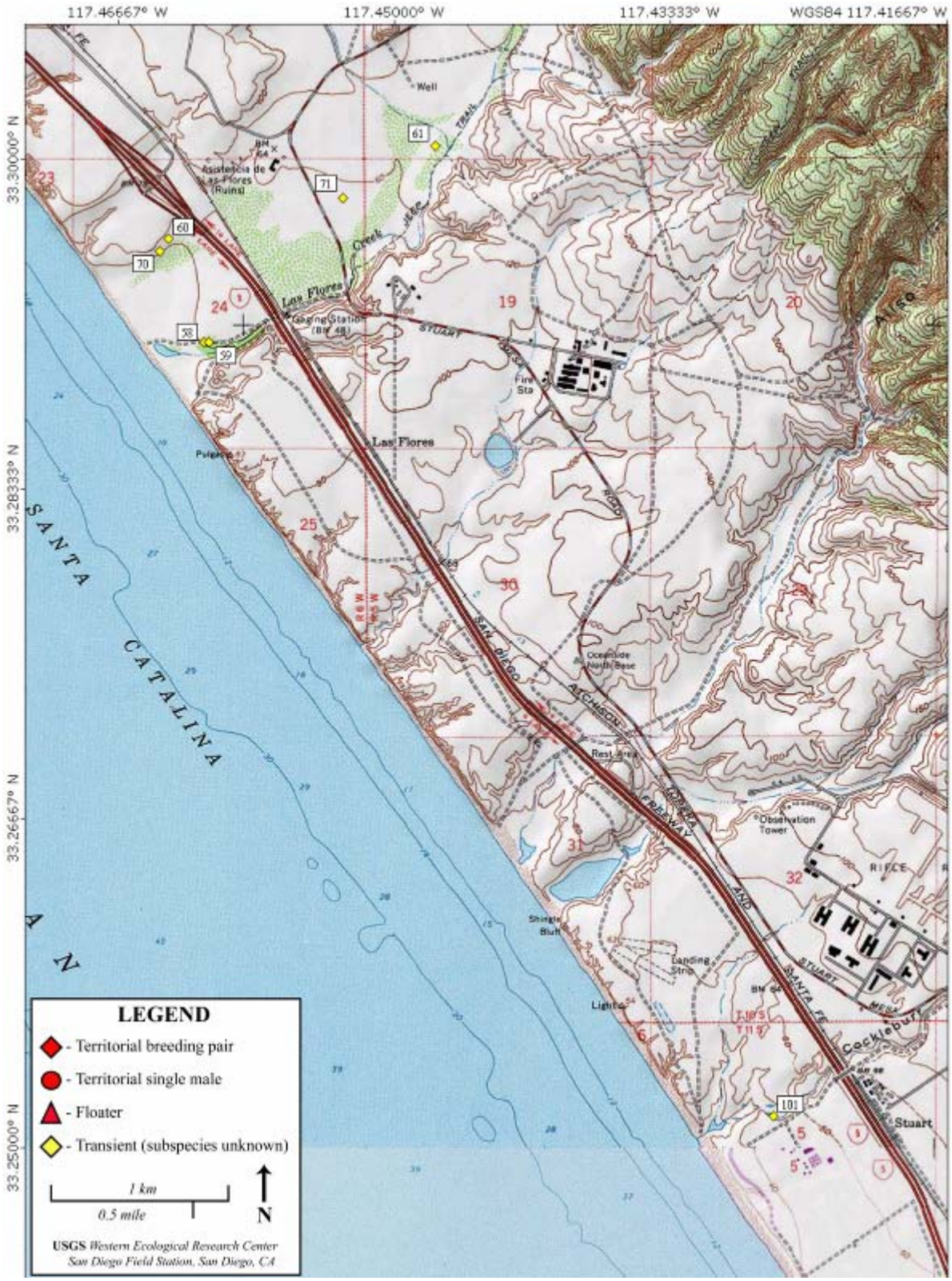

Figure 14. Locations of willow flycatchers at Marine Corps Base Camp Pendleton, 2004: Las Flores Creek and Cockleburr Canyon

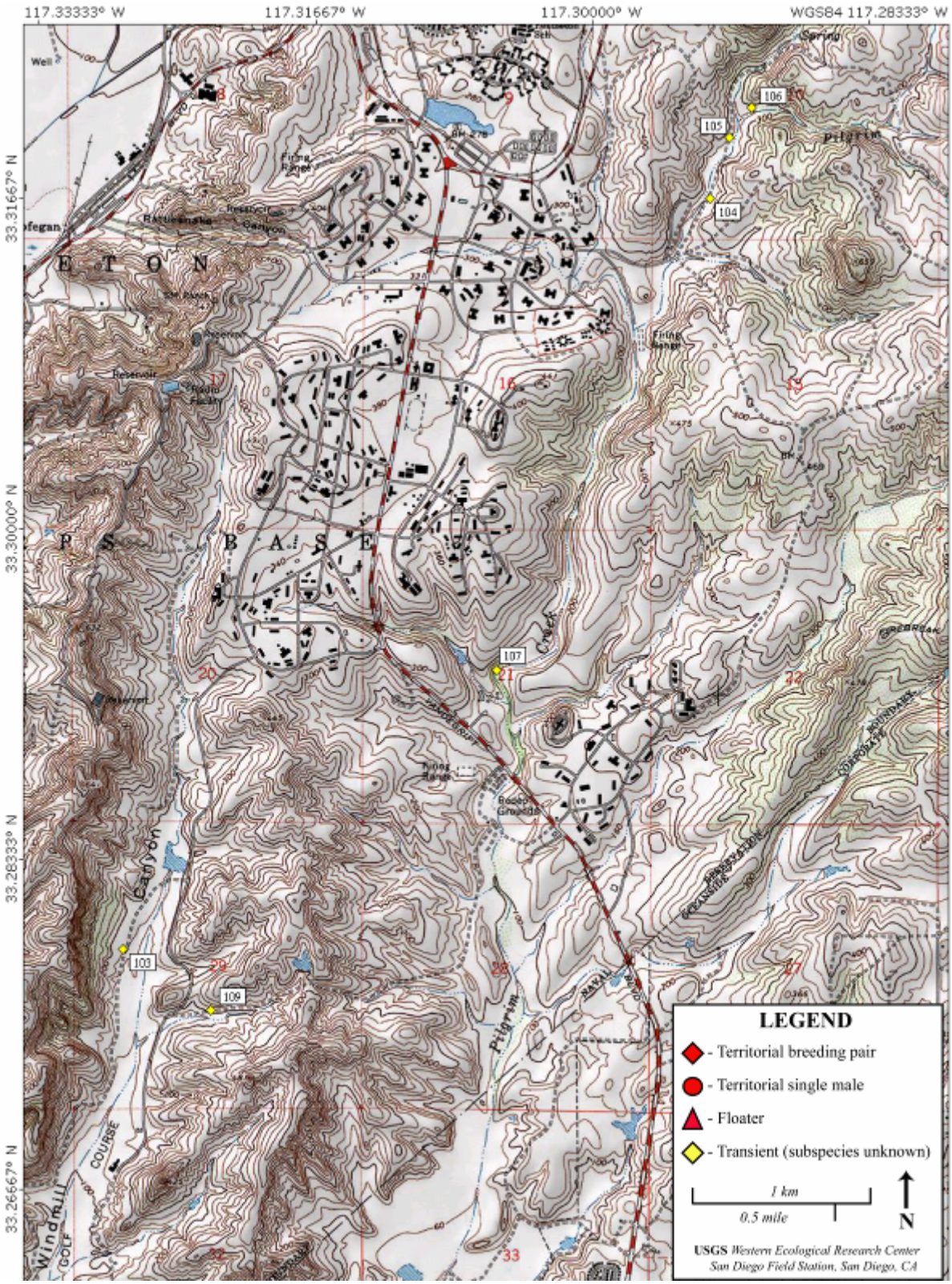

Figure 15. Locations of willow flycatchers at Marine Corps Base Camp Pendleton, 2004: Pilgrim Creek and Windmill Canyon

Residents

Twenty-two females, 18 males, and two non-territorial "floater" birds remained throughout the breeding season (Figures 8-9, 13, 16-27). Three of the males were single and 15 were paired. Five of the 15 paired males were polygynous, three pairing with two females each and two pairing with three females each, for a total of 22 pairs (Figures 18, 22-23, 25-26). The two floaters, which held no fixed territories, were both probable males based on the assumption that all females were monogamously or polygynously mated. One was detected near territory EDY once in early July, and the other was seen in and around territories BLH, BNG, and BTY consistently during the latter half of July (Figures 21, 26).

As in 2003 (Kus and Kenwood 2005), resident flycatchers were restricted to the Santa Margarita River, Lake O'Neill on Fallbrook Creek, and Las Flores Creek upstream of Basilone Road. Flycatcher distribution on the Santa Margarita River contracted relative to previous years, with no birds detected in the northern (Hospital) or southern (transmission lines) regions of habitat typically occupied by flycatchers. However, flycatchers re-colonized the vicinity of Air Station on the east side of the river (Figure 17) where they last occurred in 2001 (Kus and Ferree 2002).

Habitat Characteristics

Seventy percent (69/98, excluding Bird 89 (a floater seen within Territories BLH, BNG, and BTY), eight transients that co-occurred with other transients in mixed willow sites, and two transients that co-occurred in oak-sycamore sites) of all flycatcher locations occurred in habitat classified as mixed willow riparian (Table 1), with a dense understory of stinging nettles (*Urtica dioica*), poison hemlock (*Conium maculatum*), or blackberry (*Rubus ursinus*) often present. Ten percent (10/98) each of the locations were in willow-sycamore dominated habitats and oak-sycamore dominated habitats. The willow-sycamore habitat occurred primarily along San Onofre and Las Flores Creeks and the bird sightings in oak-sycamore habitat occurred solely along Horno Canyon. An additional 9% (9/98) of sites were in riparian and upland scrub habitats. While transients used all habitat types, resident flycatchers were found almost exclusively (88%) in mixed willow riparian (22/25 territories, 1/1 floaters, again excluding Bird 89).

Exotic vegetation was recorded in 89% (87/98, again excluding 11 flycatchers that were detected within the same use areas as other flycatchers (see above)) of flycatcher locations, and was the dominant vegetation (% cover of exotics > 50; Table 1) in 6% (5/87) of those sites, with no difference noted between transients and residents in this regard. The most common exotic plants in habitat used by flycatchers were poison hemlock, mustard (*Brassica nigra*), giant reed, and tamarisk.

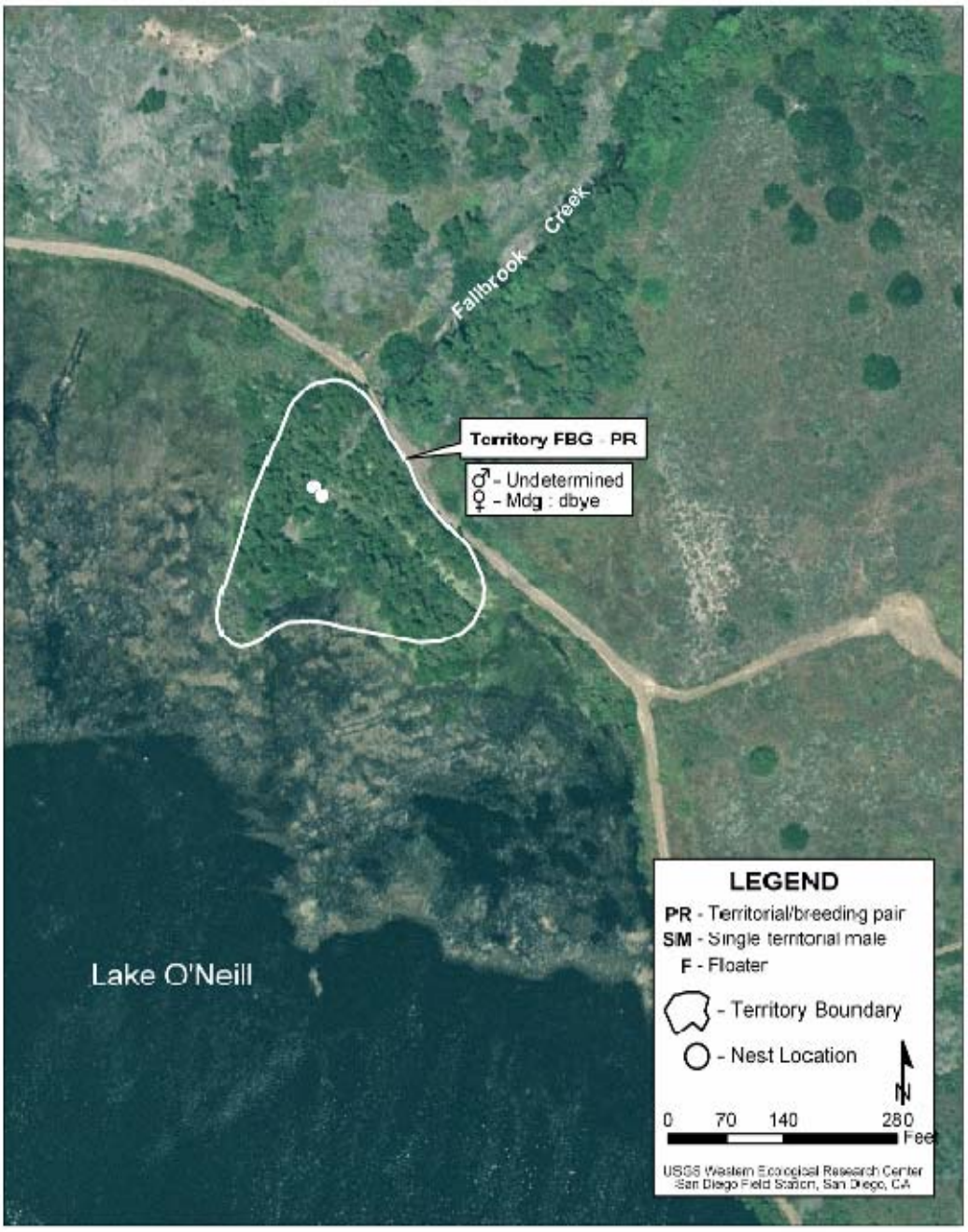

Figure 16. Southwestern willow flycatcher territories at Marine Corps Base Camp Pendleton, 2004: Lake O'Neill, Fallbrook Creek

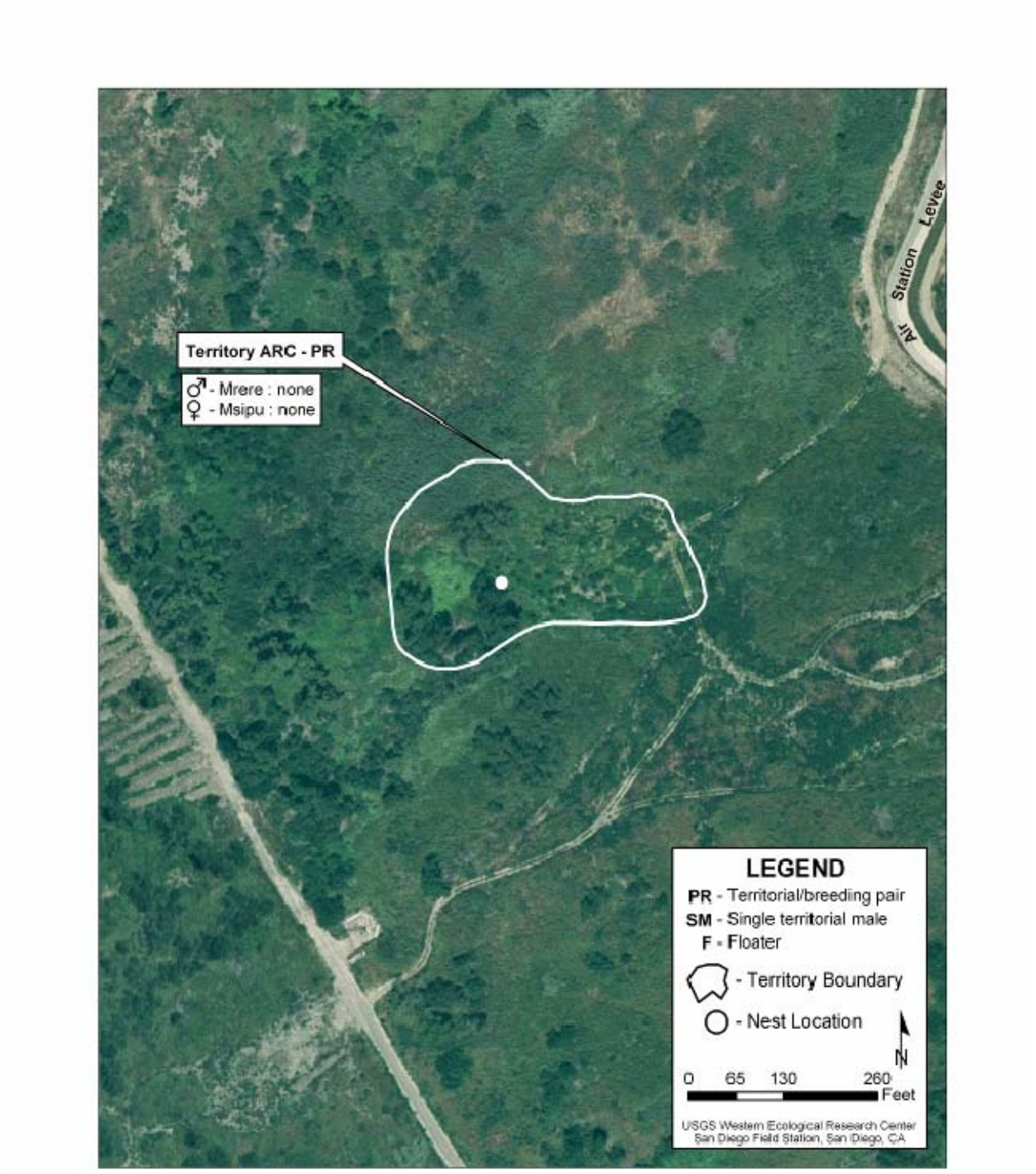

Figure 17. Southwestern willow flycatcher territories at Marine Corps Base Camp Pendleton, 2004: Air Station, Santa Margarita River

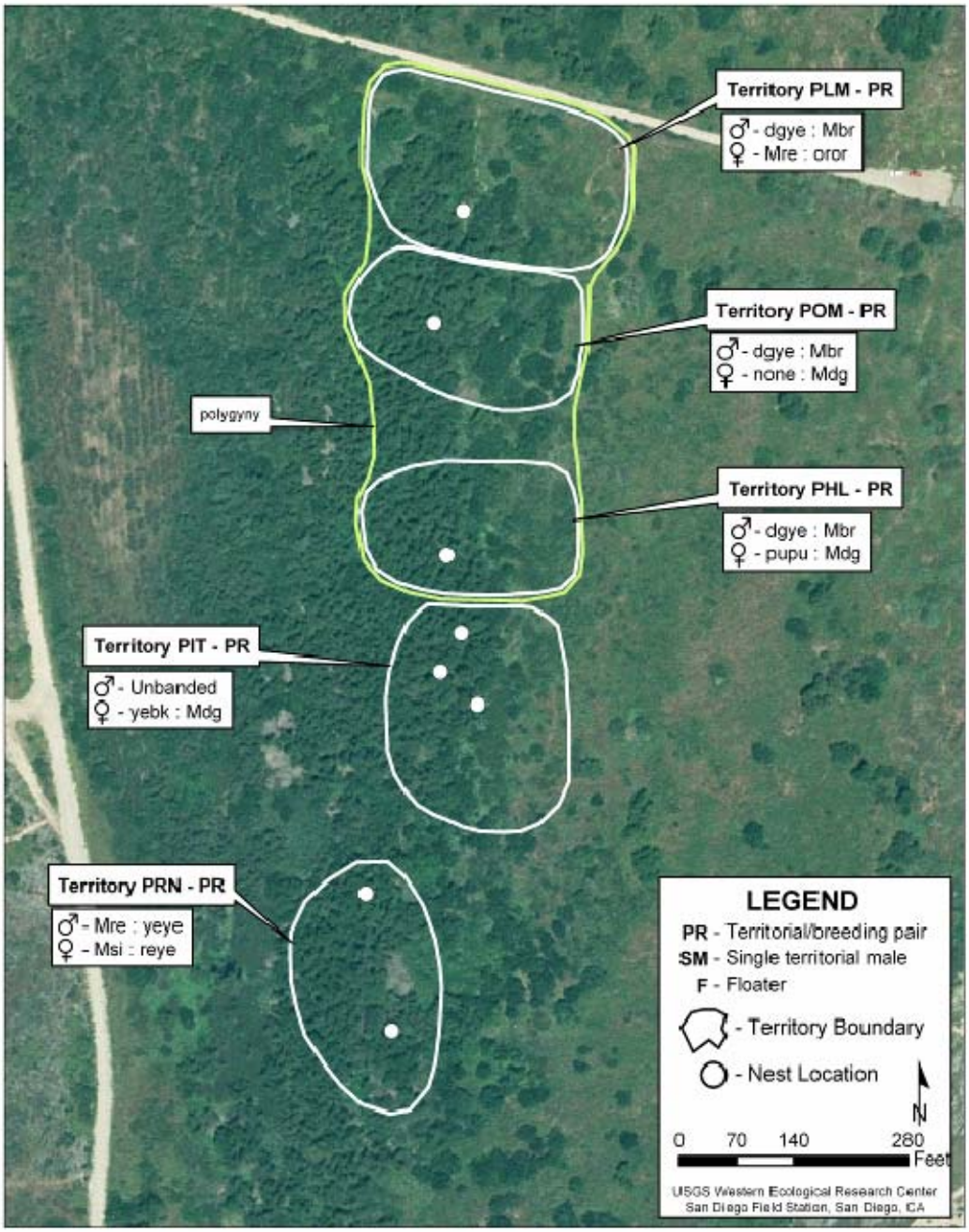

Figure 18. Southwestern willow flycatcher territories at Marine Corps Base Camp Pendleton, 2004: Pump Road (upper), Santa Margarita River

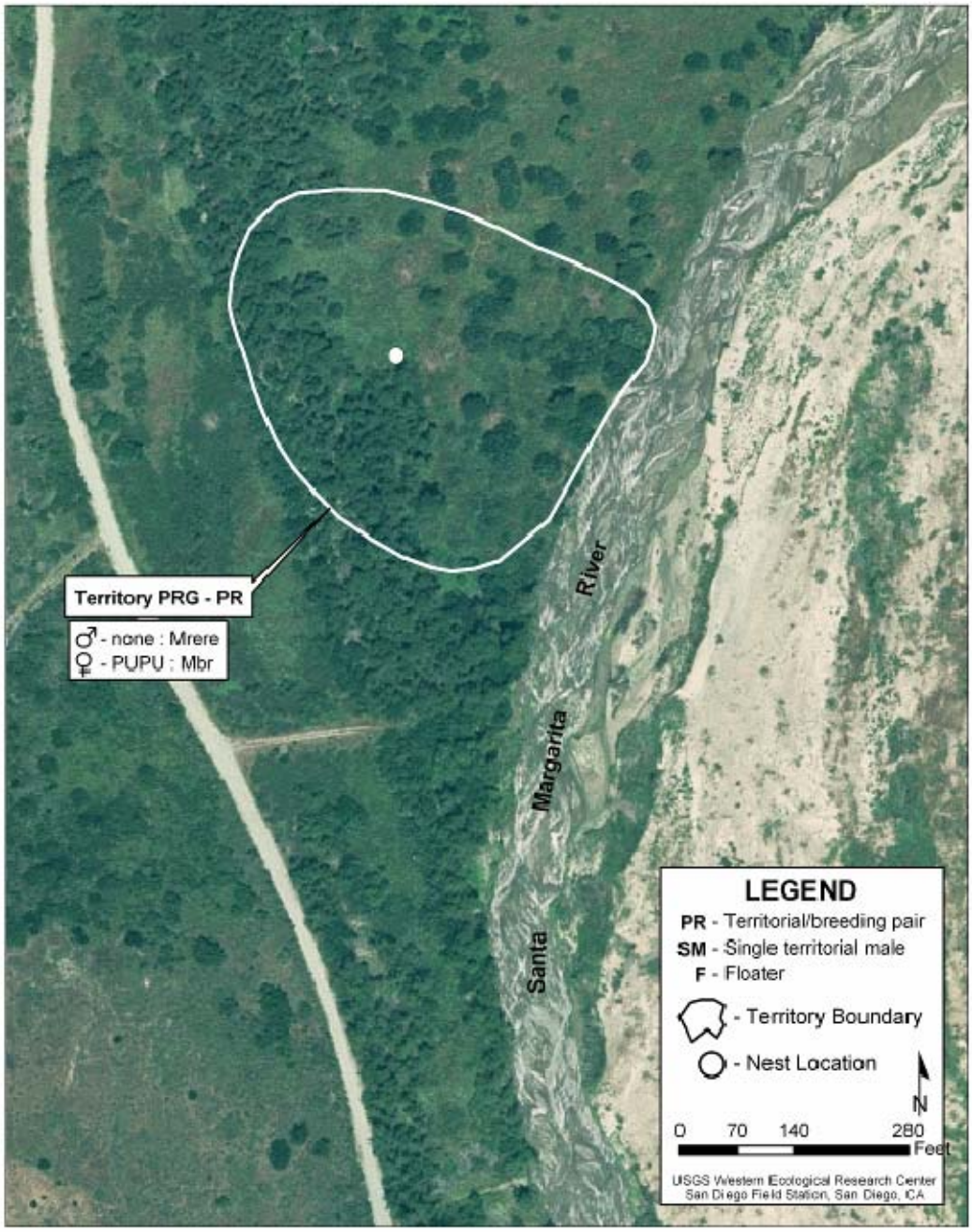

Figure 19. Southwestern willow flycatcher territories at Marine Corps Base Camp Pendleton, 2004: Pump Road (middle), Santa Margarita River

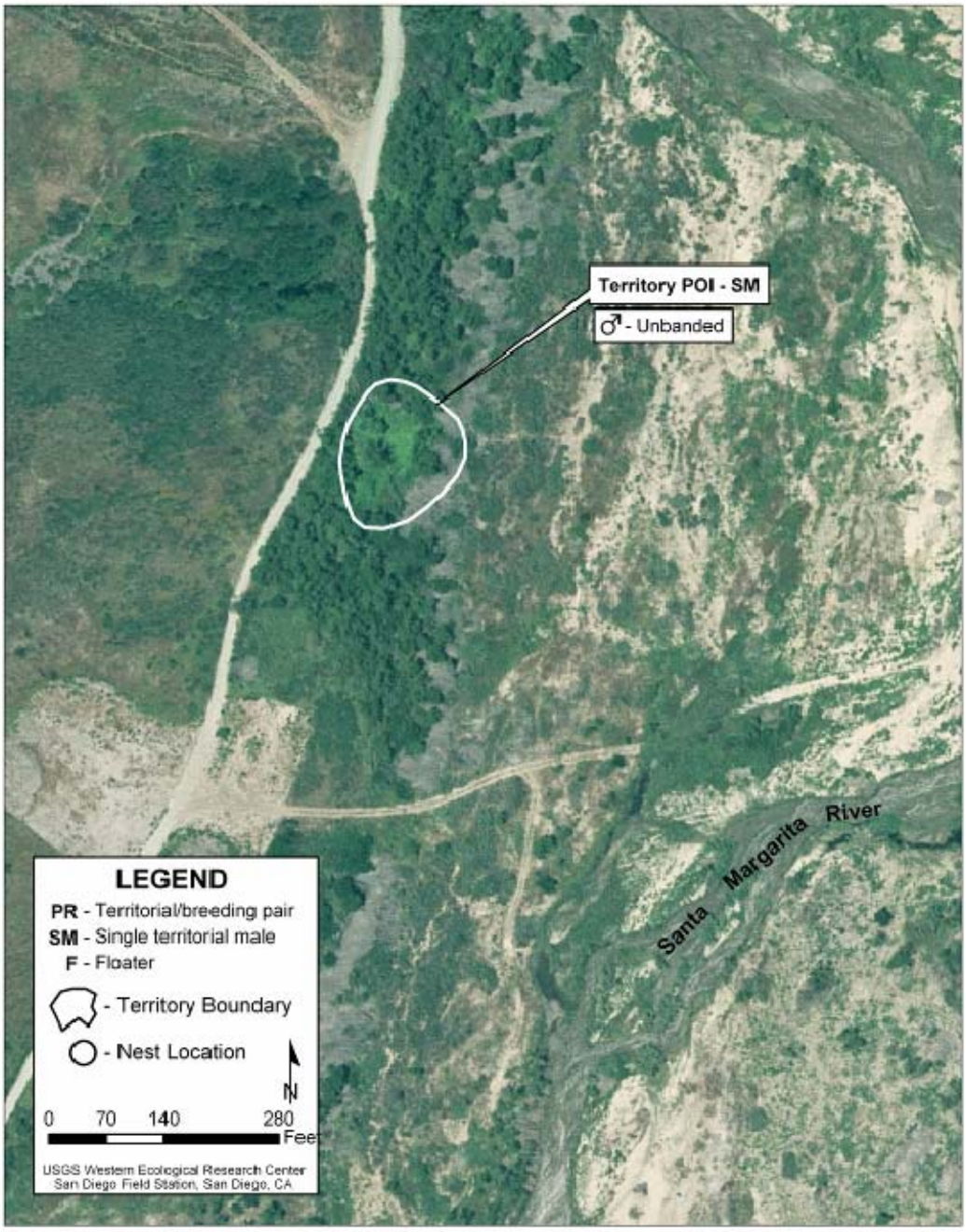

Figure 20. Southwestern willow flycatcher territories at Marine Corps Base Camp Pendleton, 2004: Pump Road (lower), Santa Margarita River

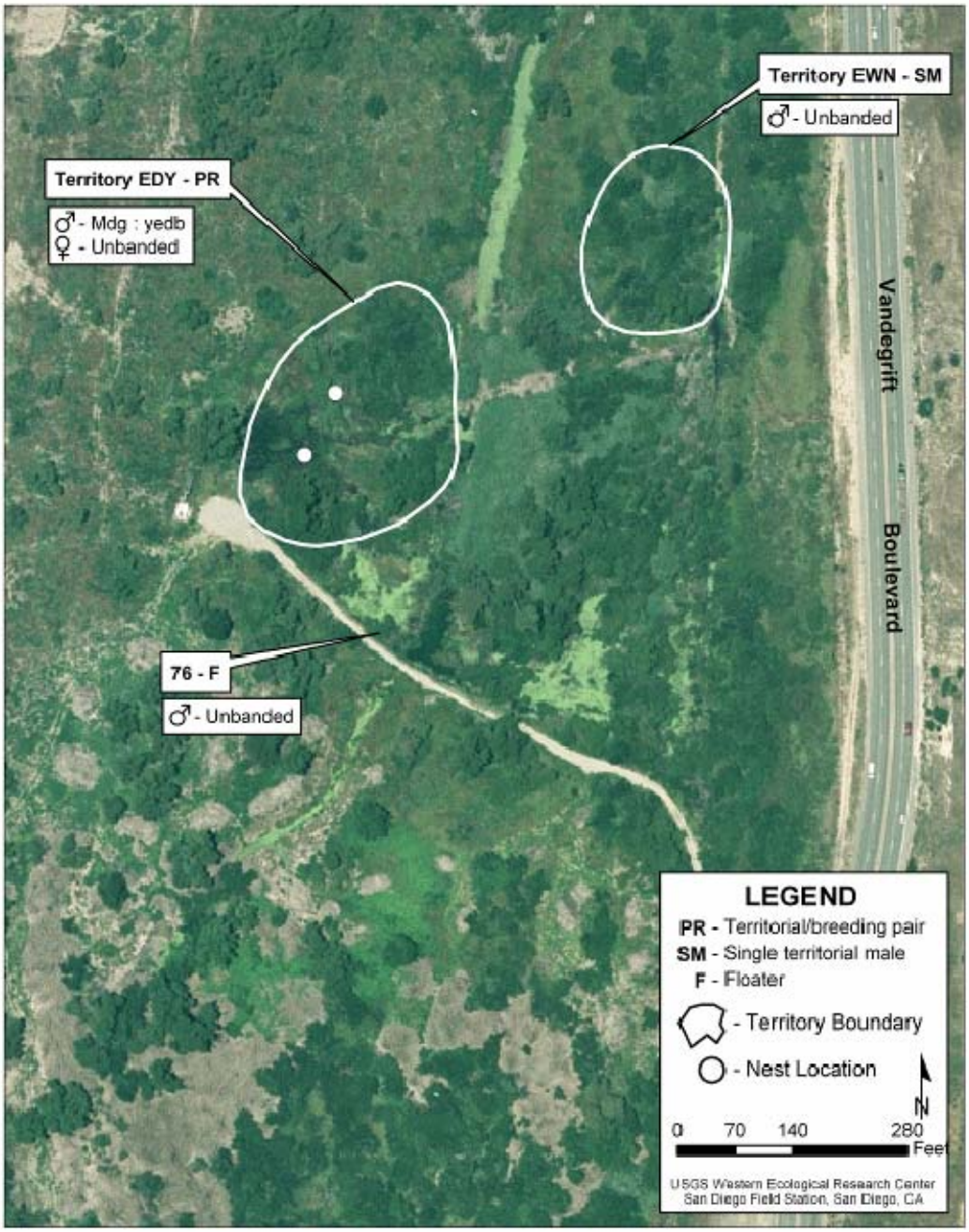

Figure 21. Southwestern willow flycatcher territories at Marine Corps Base Camp Pendleton, 2004: Pueblitos (upper), Santa Margarita River

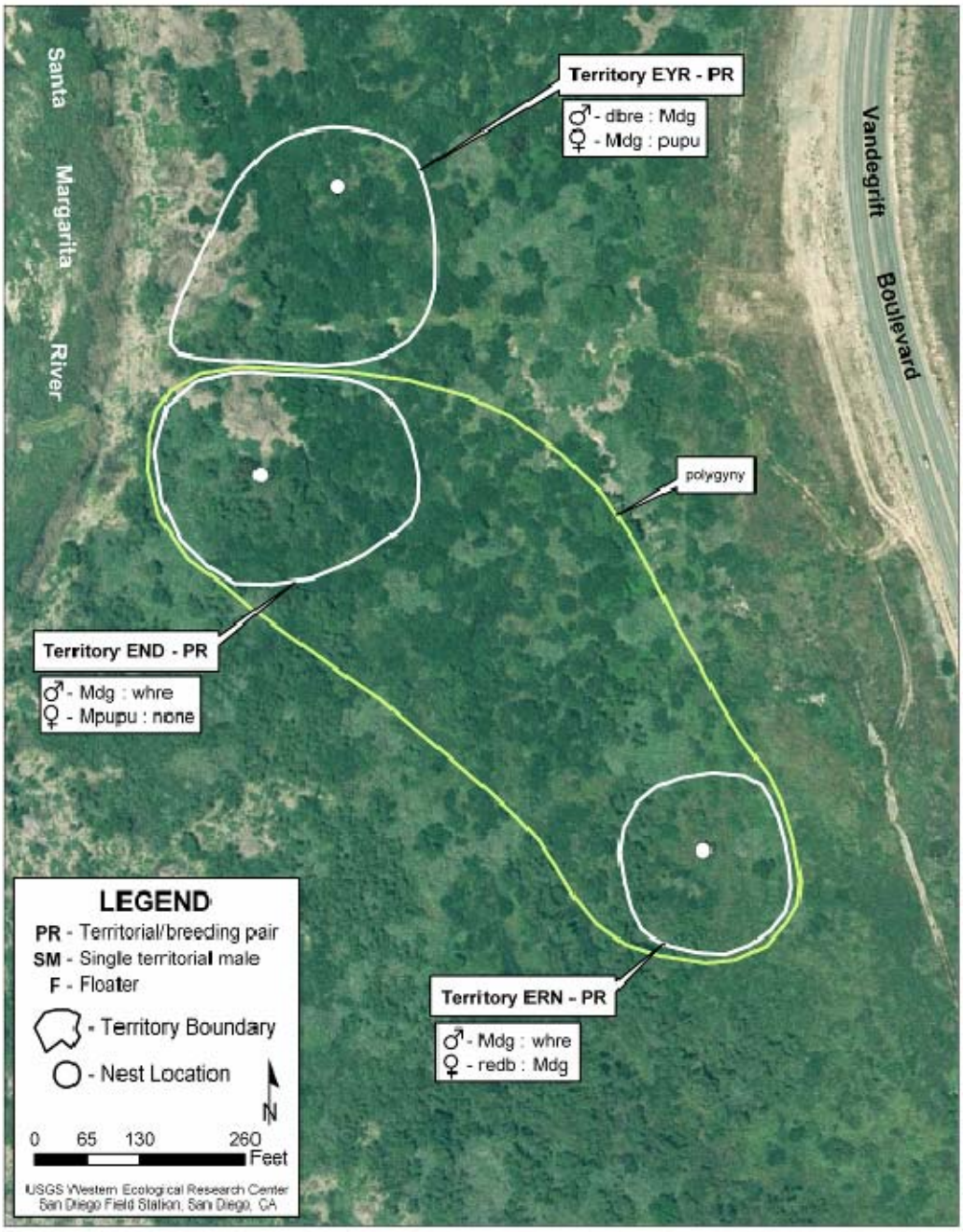

Figure 22. Southwestern willow flycatcher territories at Marine Corps Base Camp Pendleton, 2004: Pueblitos (lower), Santa Margarita River

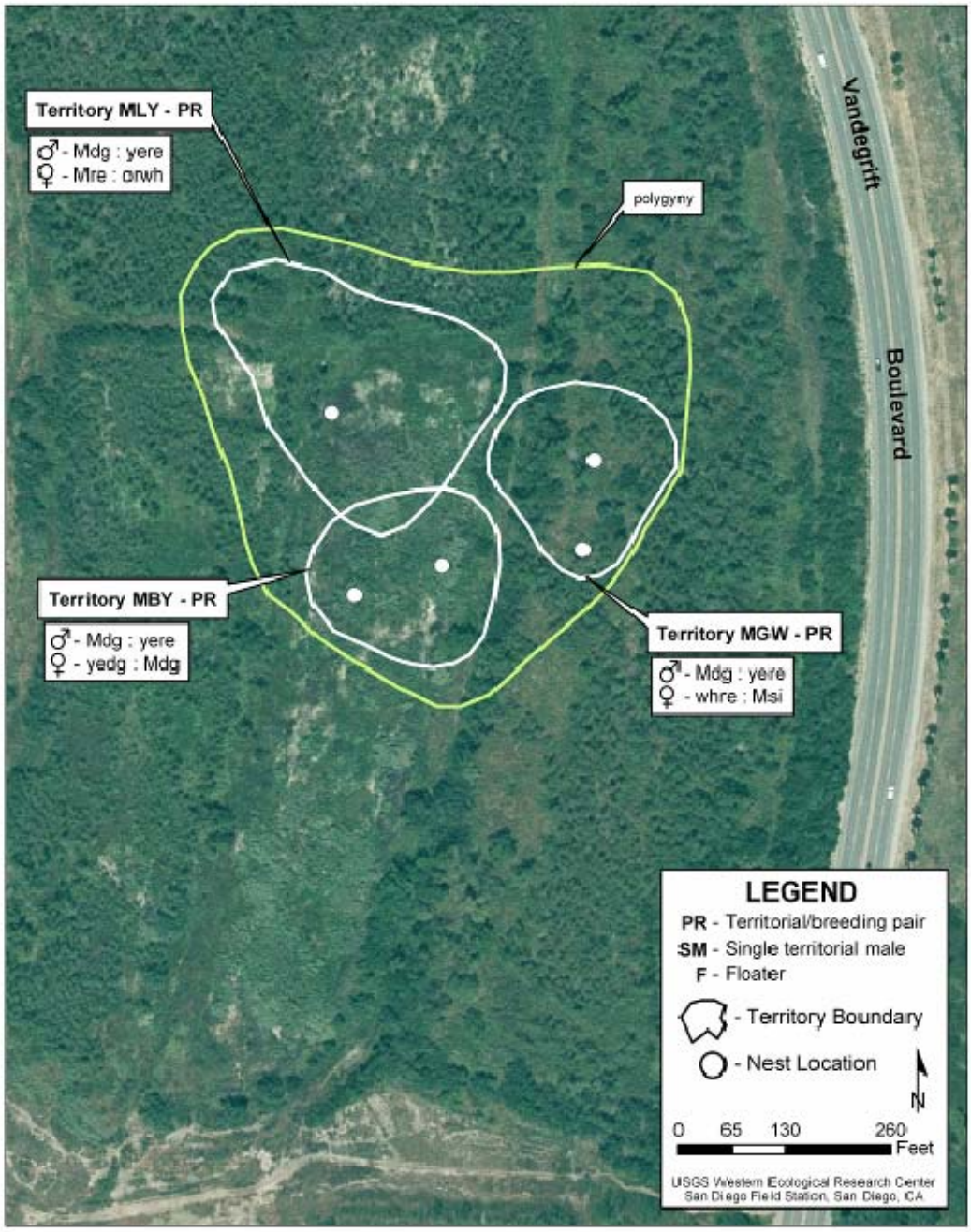

Figure 23. Southwestern willow flycatcher territories at Marine Corps Base Camp Pendleton, 2004: Ysidora Ponds (upper), Santa Margarita River

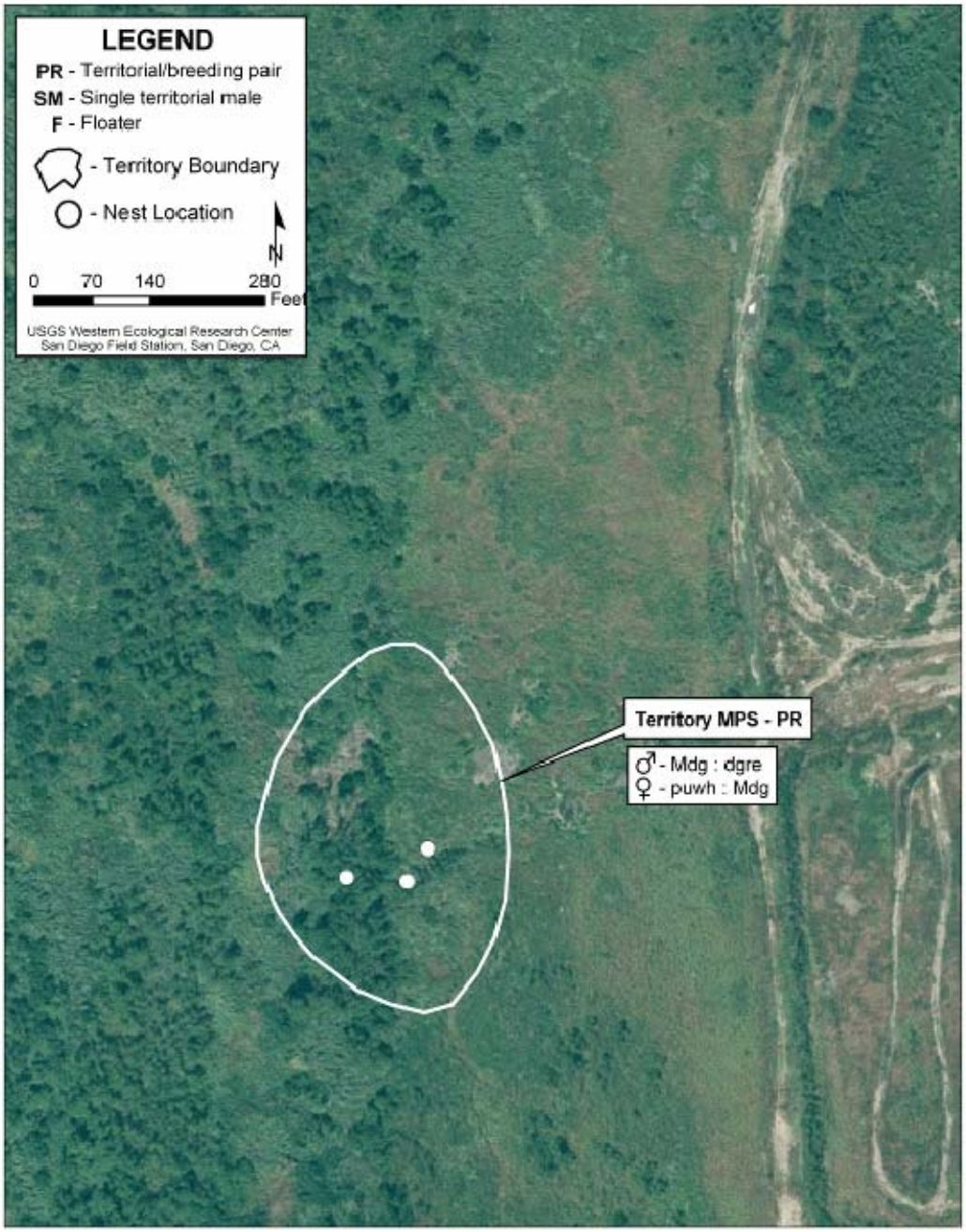

Figure 24. Southwestern willow flycatcher territories at Marine Corps Base Camp Pendleton, 2004: Ysidora Ponds (lower), Santa Margarita River

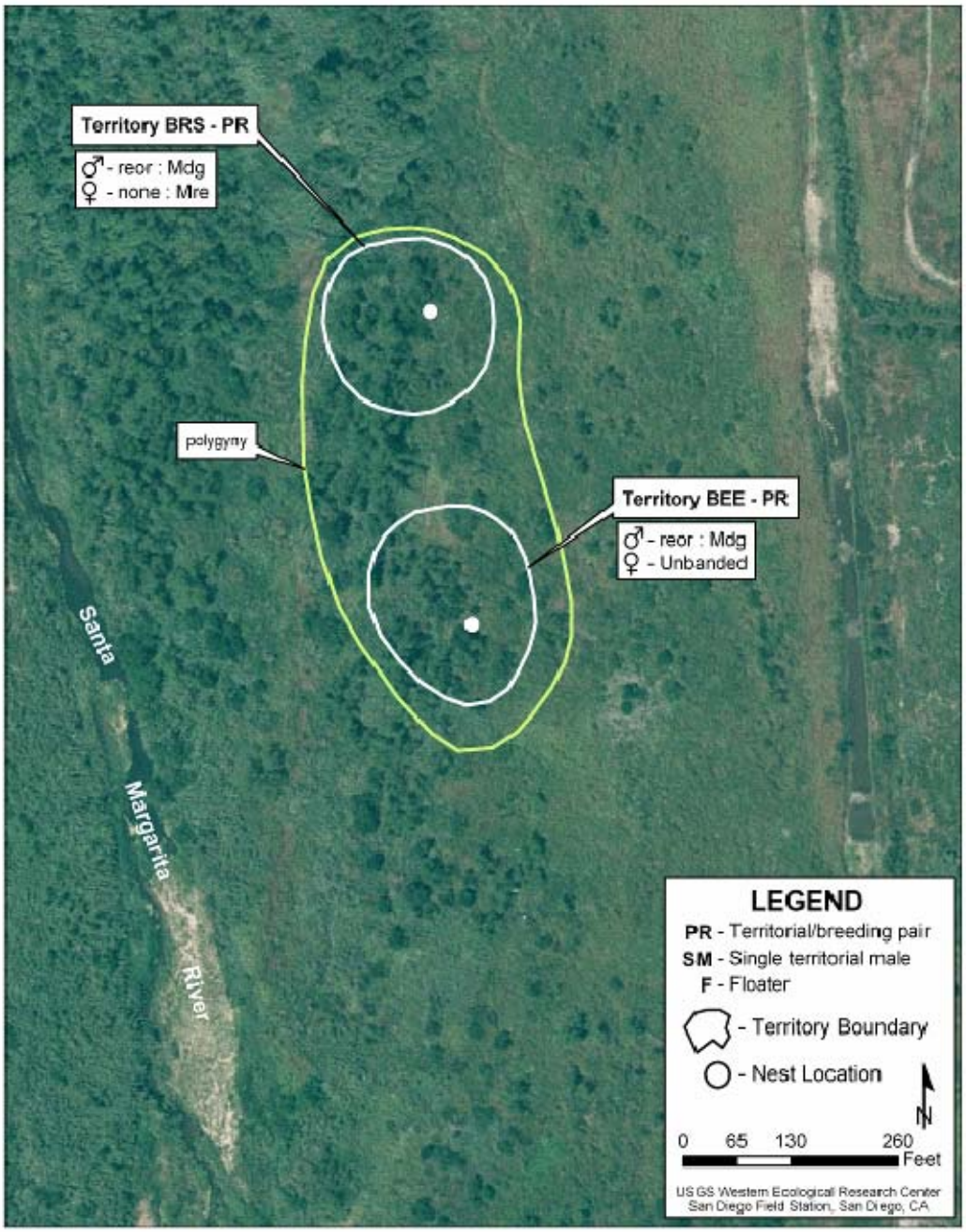

Figure 25. Southwestern willow flycatcher territories at Marine Corps Base Camp Pendleton, 2004: Bell (El Camino Real) (upper), Santa Margarita River

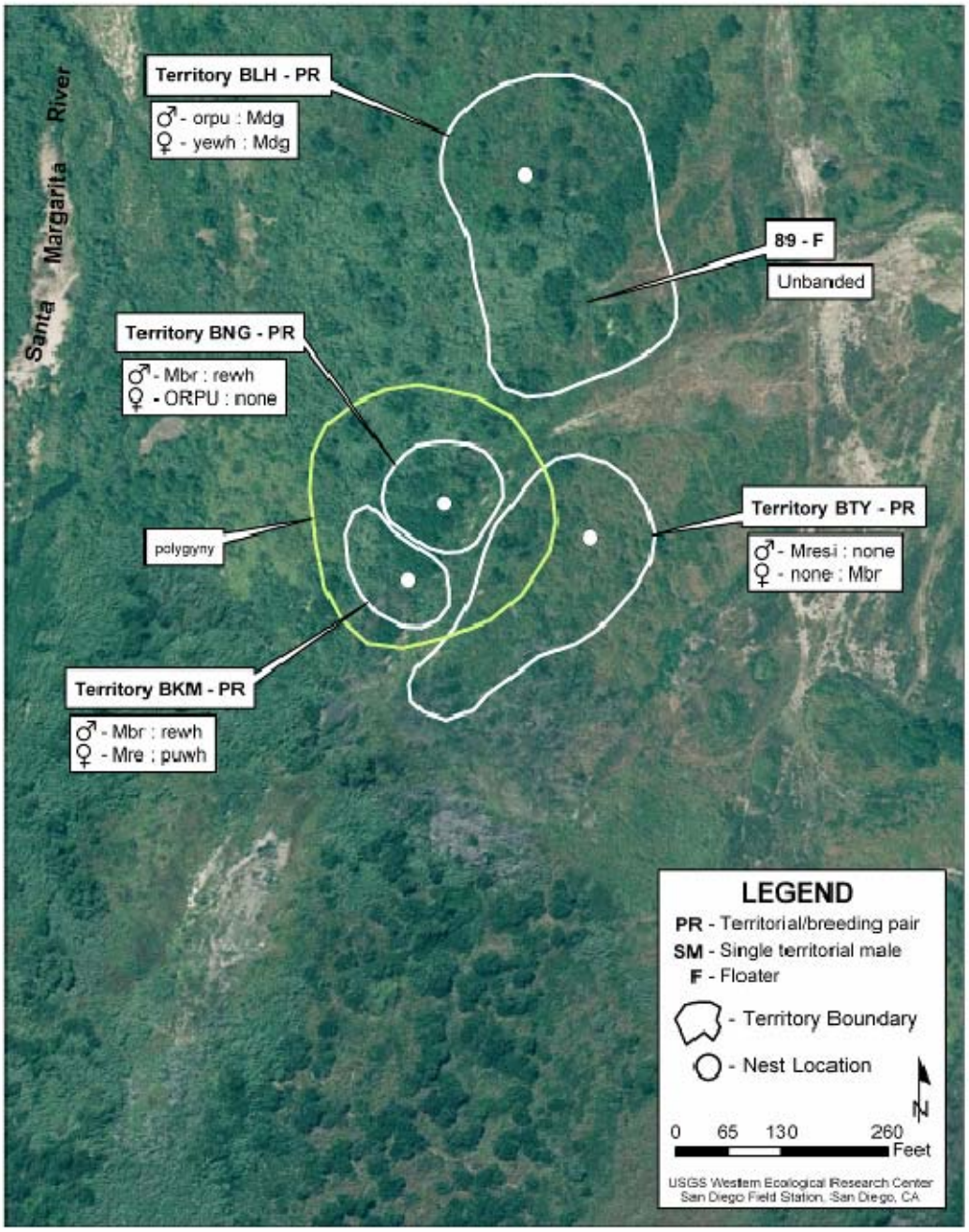

Figure 26. Southwestern willow flycatcher territories at Marine Corps Base Camp Pendleton, 2004: Bell (El Camino Real) (lower), Santa Margarita River

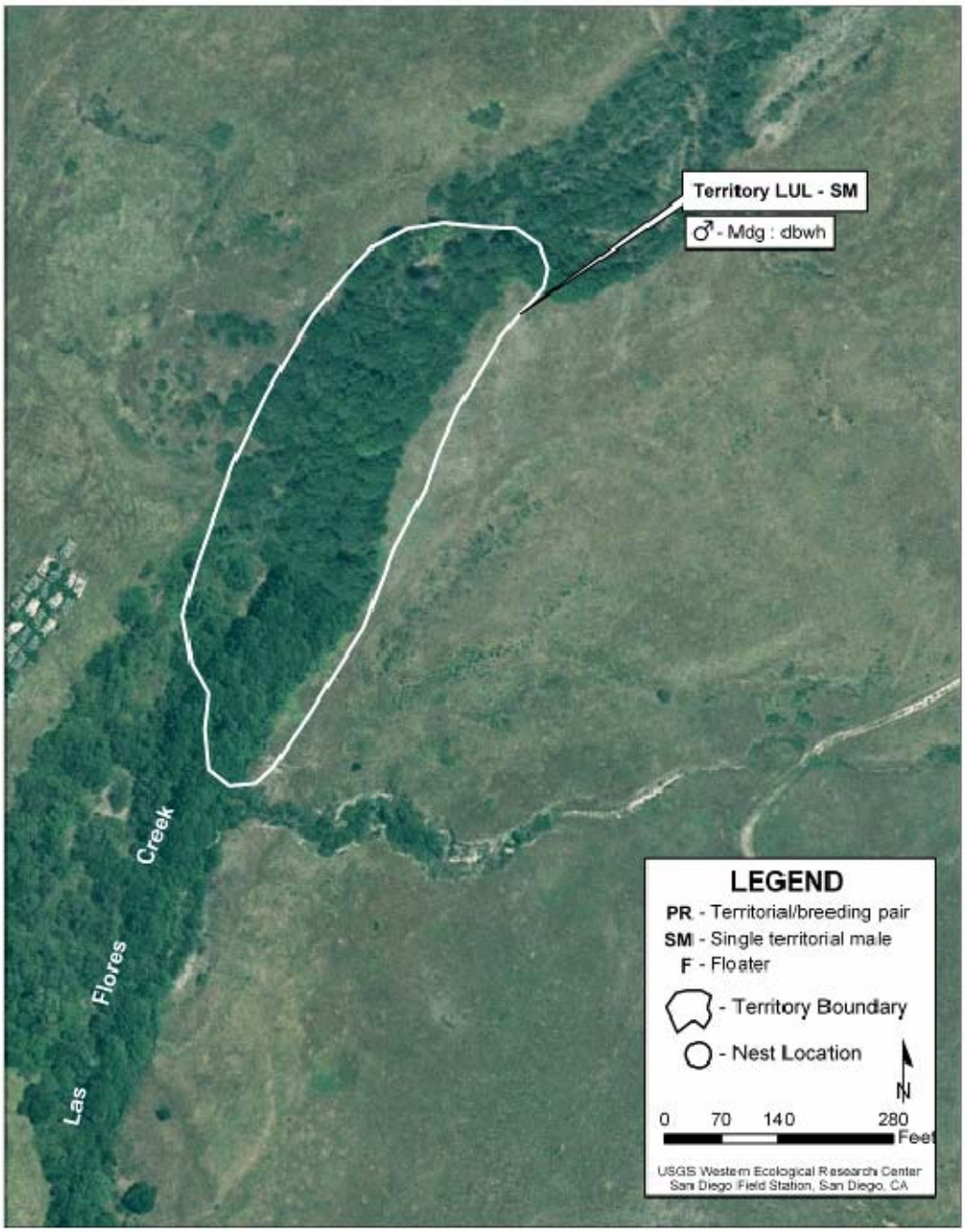

Figure 27. Southwestern willow flycatcher territories at Marine Corps Base Camp Pendleton, 2004: Upstream of Basilone Road, Las Flores Creek

Flycatcher locations differed in their proximity to surface water (Table 1). Transient flycatchers exhibited a bimodal distribution with regard to distance to the nearest surface water, with 51% (37/72, excluding ten birds co-occurring with others in the same locations; see above) within 72 m, and the rest ≥100 m away. Only 27% (7/26, excluding floater Bird 89) of resident (single, paired, or floater) flycatchers were within 85 m of surface water, and the rest were ≥100 m away. On average, transients and residents were similar with regard to proximity to water, but transients were more variable (transients: $\bar{x} = 274 \pm 374$ m (standard deviation here and throughout), residents: $\bar{x} = 231 \pm 179$ m). This differs from previous years when transients were typically 2-3 times as far from water as were residents (Kus and Kenwood 2003, 2005).

Table 1. Habitat characteristics of willow flycatcher locations at Marine Corps Base Camp Pendleton in 2004.

Bird ID	Drainage	Status[a]	Habitat Type[b]	% Cover Exotics[c]	Dominant Exotic[d]	Distance to Surface Water (m)
101	Cockleburr	T	Mixed willow riparian	1	None	0
203	Fallbrook	T	Mixed willow riparian	1	TAM	10
204	Fallbrook	T	Mixed willow riparian	1	None	500
8	Fallbrook	T	Mixed willow riparian	1	TAM	10
FBG	Fallbrook	P	Mixed willow riparian	1	TAM	10
10	Horno	T	Willow-sycamore	1	BRA	250
100	Horno	T	Oak-sycamore	1	BRA	20
11	Horno	T	Oak-sycamore	1	FOE	20
12	Horno	T	Oak-sycamore	1	BRA	20
13	Horno	T	Oak-sycamore	1	BRA	20
14	Horno	T	Oak-sycamore	1	BRA	20
15	Horno	T	Oak-sycamore	1	BRA	20
16	Horno	T	Oak-sycamore	1	BRA	20
17	Horno	T	Upland Scrub	1	None	20
18	Horno	T	Oak-sycamore	1	None	20
19	Horno	T	Oak-sycamore	1	None	20
20	Horno	T	Mixed willow riparian	1	BRA	5
21	Horno	T	Oak-sycamore	1	BRA	20
22	Horno	T	Oak-sycamore	1	BRA	20
98	Horno	T	Mixed willow riparian	1	BRA	5
99	Horno	T	Oak-sycamore	1	None	20
151	Las Flores	T	Mixed willow riparian	1	BRA	10
152	Las Flores	T	Mixed willow riparian	2	FOE	100
153	Las Flores	T	Mixed willow riparian	2	CON	50
58	Las Flores	T	Mixed willow riparian	1	CON	150
59	Las Flores	T	Mixed willow riparian	1	CON	150
60	Las Flores	T	Mixed willow riparian	1	None	660
61	Las Flores	T	Willow-sycamore	1	BRA	1780
62	Las Flores	T	Mixed willow riparian	2	BRA, CON	1230

Table 1 (*continued*). Habitat characteristics of willow flycatcher locations at Marine Corps Base Camp Pendleton in 2004.

Bird ID	Drainage	Status[a]	Habitat Type[b]	% Cover Exotics[c]	Dominant Exotic[d]	Distance to Surface Water (m)
63	Las Flores	T	Willow-sycamore	1	RIN, CON	380
64	Las Flores	T	Willow-sycamore	1	RIN, CON	360
65	Las Flores	T	Mixed willow riparian	1	BRA, CON	720
66	Las Flores	T	Mixed willow riparian	1	BRA	750
67	Las Flores	T	Mixed willow riparian	1	CON, BRA	650
68	Las Flores	T	Willow-sycamore	1	CON, BRA	650
70	Las Flores	T	Mixed willow riparian	1	None	580
71	Las Flores	T	Mixed willow riparian	1	BRA	1220
91	Las Flores	T	Mixed willow riparian	1	BRA	10
92	Las Flores	T	Mixed willow riparian	1	BRA	20
93	Las Flores	T	Mixed willow riparian	1	ANN	0
LEX	Las Flores	T	Mixed willow riparian	1	BRA	10
LLQ	Las Flores	T	Mixed willow riparian	1	ANN	0
LUL	Las Flores	S	Mixed willow riparian	1	ANN	0
102	Piedra de Lumbre	T	Mixed willow riparian	3	BRA	10
104	Pilgrim	T	Mixed willow riparian	1	BRA	460
105	Pilgrim	T	Mixed willow riparian	1	BRA	810
106	Pilgrim	T	Mixed willow riparian	1	BRA	980
107	Pilgrim	T	Mixed willow riparian	2	BRA, CON	0
176	San Mateo	T	Willow-sycamore	1	BRA	1000
177	San Mateo	T	Mixed willow riparian	1	CON	3
178	San Mateo	T	Riparian Scrub	2	CON, BRA	200
179	San Mateo	T	Mixed willow riparian	2	CON	30
87	San Mateo	T	Mixed willow riparian	2	CON	30
205	San Onofre	T	Mixed willow riparian	2	ARU, TAM	570
206	San Onofre	T	Willow-sycamore	1	CON	920
94	San Onofre	T	Willow-sycamore	1	TAM	550
108	Santa Margarita	T	Mixed willow riparian	1	BRA	5
2	Santa Margarita	T	Mixed willow riparian	1	BRA	10
201	Santa Margarita	T	Mixed willow riparian	1	TAM	24
23	Santa Margarita	T	Mixed willow riparian	2	CON	100
24	Santa Margarita	T	Mixed willow riparian	2	CON	100
25	Santa Margarita	T	Riparian Scrub	3	ARU, TAM	100
26	Santa Margarita	T	Mixed willow riparian	2	ARU, CON	50
3	Santa Margarita	T	Mixed willow riparian	1	None	12
4	Santa Margarita	T	Mixed willow riparian	1	None	10
5	Santa Margarita	T	Willow-sycamore	1	None	6
56	Santa Margarita	T	Riparian Scrub	2	CON	380
57	Santa Margarita	T	Mixed willow riparian	2	CON	110
6	Santa Margarita	T	Mixed willow riparian	1	None	3
69	Santa Margarita	T	Mixed willow riparian	2	CON	53
7	Santa Margarita	T	Willow-sycamore	1	CON	5
72	Santa Margarita	T	Mixed willow riparian	2	CON, TAM	160

Table 1 (*continued*). Habitat characteristics of willow flycatcher locations at Marine Corps Base Camp Pendleton in 2004.

Bird ID	Drainage	Status[a]	Habitat Type[b]	% Cover Exotics[c]	Dominant Exotic[d]	Distance to Surface Water (m)
73	Santa Margarita	T	Mixed willow riparian	2	CON, ARU	320
74	Santa Margarita	T	Mixed willow riparian	3	TAM, ARU	0
75	Santa Margarita	T	Mixed willow riparian	2	CON	72
76	Santa Margarita	F	Mixed willow riparian	2	CON	218
86	Santa Margarita	T	Mixed willow riparian	2	CON	450
88	Santa Margarita	T	Mixed willow riparian	1	CON	650
89	Santa Margarita	F	Mixed willow riparian	2	CON, ARU	0
9	Santa Margarita	T	Riparian Scrub	1	BRA	525
95	Santa Margarita	T	Mixed willow riparian	2	ARU, CON	50
96	Santa Margarita	T	Mixed willow riparian	2	CON	100
97	Santa Margarita	T	Mixed willow riparian	1	None	12
ARC	Santa Margarita	P	Mixed willow riparian	2	BRA, CON	375
BEE	Santa Margarita	P	Mixed willow riparian[b]	2	CON, ARU	130
BKM	Santa Margarita	P	Mixed willow riparian[b]	2	ARU	40
BLH	Santa Margarita	P	Mixed willow riparian	2	CON, ARU	60
BNG	Santa Margarita	P	Mixed willow riparian[b]	2	ARU, CON	72
BRS	Santa Margarita	P	Mixed willow riparian[b]	2	CON, ARU	412
BTY	Santa Margarita	P	Riparian Scrub	2	CON	85
EDY	Santa Margarita	P	Mixed willow riparian	2	CON, TAM	230
END	Santa Margarita	P	Mixed willow riparian[b]	2	ARU, CON	100
ERN	Santa Margarita	P	Mixed willow riparian[b]	2	CON, ARU	307
EWN	Santa Margarita	S	Mixed willow riparian	2	TAM, CON	450
EYR	Santa Margarita	P	Mixed willow riparian	2	CON	115
MBY	Santa Margarita	P	Riparian Scrub[b]	1	CON	530
MGW	Santa Margarita	P	Mixed willow riparian[b]	2	CON	650
MLY	Santa Margarita	P	Riparian Scrub[b]	1	CON, PIC	520
MPS	Santa Margarita	P	Mixed willow riparian	2	CON, ARU	200
PHL	Santa Margarita	P	Mixed willow riparian[b]	2	CON	270
PIT	Santa Margarita	P	Mixed willow riparian	2	CON	240
PLM	Santa Margarita	P	Mixed willow riparian[b]	3	CON	360
POI	Santa Margarita	S	Mixed willow riparian	1	CON	100
POM	Santa Margarita	P	Mixed willow riparian[b]	2	CON	330
PRG	Santa Margarita	P	Mixed willow riparian	2	CON	40
PRN	Santa Margarita	P	Mixed willow riparian	2	CON	150
VPR	Santa Margarita	T	Mixed willow riparian	2	CON	72
103	Windmill	T	Upland Scrub	3	BRA	500
109	Windmill	T	Mixed willow riparian	2	BRA	40

[a] T = transient, P = breeding pair, S = single resident male, F = floater resident bird.

[b] For paired birds, habitat type is considered within the male's territory boundary except for those pairs that include polygynous males, in this case habitat type is assessed within the female's use area.

[c] 1 = <5%, 2 = 5-50%, 3 = 50-95%, 4 = >95%.

[d] TAM = *Tamarix sp.*, BRA = *Brassica nigra*, FOE = *Foeniculum vulgare*, CON = *Conium maculatum*, RIN = *Ricinus communis*, ANN = Annual grasses, ARU = *Arundo donax*, PIC = *Picris echioides*.

Breeding Activities

Nesting was observed for all of the 22 pairs (Table 2). The earliest confirmed lay date was 28 May and the latest was 11 July. Sixty-seven percent (14/21, excluding MGW; Table 2) of pairs had initiated nesting by 15 June and all pairs were nesting by 7 July). Seven pairs attempted more than one nest, all but one following an unsuccessful initial attempt (although not all pairs unsuccessful on their first attempt re-nested). Of the re-nesting pairs, two attempted a third nest after two unsuccessful attempts. One pair re-nested after a successful first attempt, and fledged young from both nests. Nesting continued through August, with the last young fledged on 3 August. Sixty-eight percent of pairs (15/22) fledged at least one young by the end of the season.

A total of 31 nests was located. One was found just after it failed (MGW; Table 2); the other 30 were monitored throughout the period they were active. Sixteen nests (52%) were successful, fledging 1-4 young each. Fifteen nests (48%) failed to fledge young. Nine of the unsuccessful nests were depredated; one during the egg stage, seven during the nestling stage, and one at an undetermined stage (near hatch date). One nest was abandoned after one of the eggs was destroyed. Four nests, all placed in poison hemlock, failed when the supporting plant collapsed. Two of these nests failed before eggs were laid, and the other two failed after laying. The nest produced by pair MGW (Table 2) may also have failed as a result of host plant collapse.

Clutch size, estimated from 25 nests containing known full clutches, averaged 3.2 ± 0.6 eggs. Thirty-nine fledglings were produced, yielding an estimate of seasonal productivity of 1.8 young per pair (39 young/22 pairs).

Table 2. Nesting activity of southwestern willow flycatcher pairs at Marine Corps Base Camp Pendleton in 2004.

Pair ID	Lay Date	# Eggs	# Nestlings	# Fledglings	Comments
FBG	15 June	3	0	0	Depredated.
	28 June	3	3	0	Depredated.
ARC	30 June	2	1	1	1 egg did not hatch after ≥22 days.
BEE	28 May	4	4	4	
BKM	28 May[a]	3	0	0	Eggs did not hatch after ≥14 days; nest abandoned (1 egg destroyed just before abandonment).
BLH	1 June	4	2	2	2 eggs did not hatch after ≥20 days.
BNG	31 May	3	2	1	1 egg did not hatch after ≥20 days; 1 nestling disappeared.
BRS	24 June	3	2	2	1 egg did not hatch after >21 days (disappeared during nestling stage).
BTY	15 June	3	3	3	

Table 2 (*continued*). Nesting activity of southwestern willow flycatcher pairs at Marine Corps Base Camp Pendleton in 2004.

Pair ID	Lay Date	# Eggs	# Nestlings	# Fledglings	Comments
EDY	30 May	4	3	3	1 egg disappeared.
	4 July	4	4	4	
END	22 June	2	1	1	1 egg disappeared.
ERN	6 June	3	2	2	1 egg did not hatch after ≥21 days (disappeared during nestling stage).
EYR	29 June	3	3	0	Depredated.
MBY	13 June	3	3	0	Depredated.
	11 July	3	3	0	Depredated.
MGW	Unknown	0+[b]	0	0	Nest found after failure; cause of failure possibly host plant collapse.
	28 June	3	3	0	Depredated.
MLY	7 July	3	3	0	Depredated.
MPS	Not applicable	0	0	0	Host plant collapsed; nest failed before egg laying.
	Not applicable	0	0	0	Host plant collapsed; nest failed before egg laying.
	8 June	4	3	3	1 egg disappeared.
PHL	30 May	3	3	3	
PIT	28 May[a]	4	0	0	Host plant collapsed, spilling nest contents.
	15 June[a]	3	0+[c]	0	Depredated.
	4 July	3	3	3	
PLM	23 June	3	3	3	
POM	6 June	3	3	2	1 nestling found dead under nest.
PRG	24 June	3	3	0	Depredated.
PRN	15 June[a]	3	0	0	1 egg disappeared during incubation. Host plant collapsed, spilling nest contents.
	7 July	3	2	2	1 egg disappeared.

[a] Date estimated.
[b] Nest contents not seen before failure; laying not confirmed.
[c] Based on estimated hatch date; eggs may have hatched just before failure.

Nest Site Characteristics

Flycatchers placed nests in eight species of plants (Table 3), including black willow *(S. gooddingii*), arroyo willow (*S. lasiolepis*), sandbar willow (*S. exigua*), mule fat (*B. salicifolia*), stinging nettle, poison hemlock, giant reed, and poison oak (*Toxicodendron diversilobum*). Fifty-two percent of nests were placed in native species: 26% (8/31) in willow, 16% (5/31) in stinging nettle, 7% (2/31) in mule fat, and 3% (1/31) in poison oak. Forty-eight percent of nests were placed in exotic species: 42% (13/31) in poison hemlock, and 6% (2/31) in giant reed. Nest height averaged 1.8 $\pm$ 0.6 m (N = 31), while host height averaged 4.0 $\pm$ 2.8 m (N = 31).

Table 3. Nest site characteristics of southwestern willow flycatchers at Marine Corps Base Camp Pendleton in 2004.

Pair ID	Host Species	Host Height (m)	Nest Height (m)
FBG	*Salix gooddingii*	12.0	2.8
FBG	*Salix lasiolepis*	11.0	2.1
ARC	*Salix lasiolepis*	8.5	0.6
BEE	*Salix lasiolepis*	11.0	1.6
BKM	*Arundo donax*	2.8	2.2
BLH	*Urtica dioica*	2.6	1.7
BNG	*Arundo donax*	2.4	2.0
BRS	*Salix lasiolepis*	5.2	2.0
BTY	*Baccharis salicifolia*	3.3	1.6
EDY	*Conium maculatum*	2.0	1.8
EDY	*Salix gooddingii*	6.4	1.4
END	*Toxicodendron diversilobum*	2.2	2.0
ERN	*Conium maculatum*	2.0	1.5
EYR	*Conium maculatum*	1.9	1.1
MBY	*Salix exigua*	4.7	3.6
MBY	*Salix exigua*	3.1	2.6
MGW	*Conium maculatum*	2.4	1.6
MGW	*Conium maculatum*	2.0	1.4
MLY	*Baccharis salicifolia*	3.0	1.9
MPS	*Conium maculatum*	3.2	1.7
MPS	*Conium maculatum*	3.4	1.4
MPS	*Urtica dioica*	4.3	1.3
PHL	*Urtica dioica*	4.7	1.8
PIT	*Conium maculatum*	2.2	1.2
PIT	*Conium maculatum*	2.6	1.7
PIT	*Urtica dioica*	1.6	1.4
PLM	*Conium maculatum*	2.6	1.9
POM	*Conium maculatum*	2.9	1.8
PRG	*Conium maculatum*	2.9	2.4
PRN	*Conium maculatum*	2.5	1.7
PRN	*Urtica dioica*	3.0	1.4

Cowbird Parasitism

No instances of cowbird parasitism of southwestern willow flycatcher nests were observed in this study.

Banded Birds

All of the resident flycatchers were observed closely enough to determine with confidence whether they were banded (Table 4). Fifty percent of the males (10/20; including 18 territorial males and two floaters) and 77% (17/22) of the females were birds banded in previous years.

No banded transients were detected during surveys. Two transients captured at the MAPS station on the lower Santa Margarita River (Kus *et al.* in prep.) on 7 and 16 June 2004 were banded, but not seen again.

Five adult males and three adult females were captured and banded in 2004 (Table 4). In addition, 42 nestlings in 17 nests were banded (Appendix 1); all are believed to have fledged.

Table 4. Band status of southwestern willow flycatchers at Marine Corps Base Camp Pendleton in 2004.

Territory/ Bird ID	Status[a]	Male Banded?[b]	Female Banded?[b]	Nestlings Banded?	Comments[c]
FBG	P	LBBK:Mdg	Mdg : dbye		Male banded in 2001. Female banded in 2002.
ARC	P	Mrere : none	Msipu : none	1	Male and female banded in 2004.
PHL	P	dgye : Mbr	pupu : Mdg	3	Male polygynous. Male banded as nestling at Pueblitos in 2002. Female banded in 2003.
PIT	P	No	yebk : Mdg	3	Female banded in 2002.
PLM	P	dgye : Mbr	Mre : oror	3	Male polygynous. Male banded as nestling at Pueblitos in 2002. Female banded as nestling at Pueblitos in 2003.
POI	S	No	NA		
POM	P	dgye : Mbr	none : Mdg	2	Male polygynous. Male banded as nestling at Pueblitos in 2002. Female banded in 2001.
PRG	P	none : Mrere	PUPU : Mbr	3	Male banded in 2004. Female banded as nestling at Air Station in 2001.
PRN	P	Mre : yeye	Msi : reye	2	Male banded as nestling at Pueblitos in 2003. Female banded as nestling at Air Station in 2000.
EDY	P	Mdg : yedb	No	7	Male banded in 2004.
END	P	Mdg : whre	Mpupu : none	1	Male polygynous. Male banded in 2003. Female banded in 2004.
ERN	P	Mdg : whre	redb : Mdg	2	Male polygynous. Male banded in 2003. Female banded as adult at Guajome Park, San Luis Rey River in 2003.
EWN	S	No	NA		
EYR	P	dbre : Mdg	Mdg : pupu		Male banded in 2001. Female banded as adult in 2002.
76	F	No	NA		Near territory EDY.
MBY	P	Mdg : yere	yedg : Mdg		Male polygynous. Male and female banded in 2003.
MGW	P	Mdg : yere	whre : Msi		Male polygynous. Male banded in 2003. Female banded in 2004.
MLY	P	Mdg : yere	Mre : orwh		Male polygynous. Male banded in 2003. Female banded as nestling at Bell in 2003.
MPS	P	Mdg : dgre	puwh : Mdg	3	Male banded in 2004. Female banded in 2001 then with new combination in 2004.

Table 4 (*continued*). Band status of southwestern willow flycatchers at Marine Corps Base Camp Pendleton in 2004.

Territory/ Bird ID	Status[a]	Male Banded?[b]	Female Banded?[b]	Nestlings Banded?	Comments[c]
BEE	P	reor : Mdg	No	4	Male polygynous. Male banded in 2001; combination changed in 2004.
BKM	P	Mbr : rewh	Mre : puwh		Male is polygynous. Male banded as nestling at Whelan Lake, San Luis Rey River in 2000. Female banded as nestling at Pump Road in 2003.
BLH	P	orpu : Mdg	yewh : Mdg	2	Male banded in 2003. Female banded in 2002.
BNG	P	Mbr : rewh	ORPU : none	1	Male polygynous. Male banded as nestling at Whelan Lake, San Luis Rey River in 2000. Female banded in 2001.
BRS	P	reor : Mdg	none : Mre	2	Male polygynous. Male banded in 2001; combination changed in 2004. Female banded as nestling at Bell in 2003.
BTY	P	Mresi : none	none : Mbr	3	Male banded in 2004. Female banded as nestling at Pump Road in 2001.
89	F	No	NA		In territories BLH, BNG, and BTY
LUL	S	Mdg : dbwh	NA		Male banded in 2003. Male moved at end of season to territory ARC, then moved near territory EDY.

[a] P = pair, S = single male, F = floater.
[b] Band combinations: left leg:right leg; Msi = federal aluminum band, Mdg = anodized green federal band, Mbr = anodized bronze federal band, Mre = anodized red federal band, Mrere = federal band painted solid red, Mpupu = federal band painted solid purple, Msipu = federal band painted silver-purple split, Mresi = federal band painted red-silver split. *Celluloid bands:* PUPU = purple, ORPU = orange-purple split. *Metal bands:* pupu = purple, oror = orange, yeye = yellow, dbye = dark blue-yellow split, dgye = dark green-yellow split, yebk = yellow-black split, reye = red-yellow split, yedb = yellow-dark blue split, whre = white-red split, redb = red-dark blue split, dbre = dark blue-red split, yere = yellow-red split, yedg = yellow-dark green split, orwh = orange-white split, dgre = dark green-red split, puwh = purple-white split, reor = red-orange split, rewh = red-white split, orpu = orange-purple split, yewh = yellow-white split, dbwh = dark blue-white split.
[c] see Figures 28 and 29 for Camp Pendleton locations mentioned in the comments.

Survivorship, Site Fidelity, and Movement

The recapture and resighting of banded birds allowed us to estimate survivorship, or the proportion of individuals known to survive from one year to the next. Of the banded adult flycatchers present during the 2003 breeding season, 50% (9/18) of males, and 64% (9/14) of females returned to breed at Camp Pendleton in 2004. Survivorship was calculated based on the banded population seen at Camp Pendleton only, and does not include an additional female detected on Base in 2004 who was banded at Guajome Park on the San Luis Rey River in 2003. Overall, adult survivorship on Camp Pendleton was 56% (18/32). All but one of the returning adults (single male LUL; Table 4) paired and nested in 2004. One male present as a floater in 2003 was polygynous in 2004, nesting with three females (Figure 18).

Only five of the 34 nestlings banded in 2003 (Kus and Kenwood 2005) that survived to fledge were resighted at Camp Pendleton in 2004, yielding an estimate of first year survivorship of 15%. All returning first year adults paired and nested in 2004.

Willow flycatchers at Camp Pendleton generally settle into breeding concentrations or areas where groups of birds establish territories (Figures 28, 29). Resighting banded birds allowed us to identify individuals that returned to the same area they used the previous year. In 2004, 13 of the 18 banded returning adults (72%) present in 2003 returned to the breeding area that they occupied in 2003 (Table 5). Adding one bird last seen in 2002 who returned to the same area in 2004 increases area fidelity to 74% (14/19; Table 5). Fifty-seven percent (8/14) of the flycatchers returning to the same areas also returned to the same territories occupied in 2003, while 43% shifted territory locations within the area (Table 5).

In addition to the returning adults, one bird (territory BRS female) banded as a nestling in the Bell area in 2003 returned to breed in the same area.

Table 5. Area fidelity and between-year, within-area movement of southwestern willow flycatcher adults at Marine Corps Base Camp Pendleton in 2004.

Drainage	Area[a]	# Banded Birds in Area, 2003	# Birds Returning to Area	Area Fidelity (%)	# (%) Birds Moved Within Area	Range (Avg) of Distances Moved (m)
Fallbrook Creek	O'Neill Lake	2	2	100%	1 (50%)	68
Santa Margarita	Below Hospital	0	0	0%	N/A	N/A
	Rifle Range	0	0	0%	N/A	N/A
	Pump Road	3[b]	2[b]	67%	2 (100%)	43-130 (87)
	Pueblitos	4	3	75%	1 (33%)	400
	Ysidora Ponds	3	3	100%	0%	N/A
	Bell	3	3	100%	2 (67%)	68-413 (241)
	Vine	2	0	0%	N/A	N/A
	Stuart Mesa	1	0	0%	N/A	N/A
Las Flores Creek	Upstream of Basilone Rd.	1	1	100%	0%	N/A
Overall Totals		**19**	**14**	**74%**	**6 (43%)**	**43- 413 (199)**

[a] Figures 28 and 29 show flycatcher concentration areas.
[b] Includes one flycatcher not detected in 2003, but last seen banded in 2002 at Pump Road.

We were also able to detect willow flycatchers that returned to different areas than they had occupied in 2003. Of the 18 banded adults detected at Camp Pendleton in 2003 that returned to the Base, five (28%) returned to different breeding areas in 2004, all within the Santa Margarita River (Table 6, purple lines in Figure 28). These five birds included three males and two females; one of the males was a floater in 2003 who established a territory in 2004. Three birds moved into Bell, one each from Pueblitos, Vine, and Pump Road. Two birds moved to Pump Road, one each from Stuart Mesa and Vine (Table 6, Figure 28).

One bird banded at Guajome Park on the San Luis Rey River in 2003 was detected this

year in the Pueblitos area (Table 6, Figure 28). Two additional flycatchers banded as nestlings in the Air Station area, one in 2000 and one in 2001, were not detected at Camp Pendleton in 2003, but were present in 2004 in Pump Road (Table 6, Figure 28).

Second year birds banded as nestlings in 2003 also exhibited between-year movement from 2003 to 2004, with four of the five returning birds moving to areas other than their natal areas. Two second year birds banded as nestlings at Pueblitos in 2003 returned to Pump Road, one from Pump Road returned to Bell, and one from Bell moved to the Ysidora Ponds area (Table 6, green lines in Figure 28).

Table 6. Between-year, between-area movement of southwestern willow flycatchers at Marine Corps Base Camp Pendleton in 2004.

Year Last Detected	Area[a] Last Detected / Territory	Area Detected / Territory in 2004	Distance Moved (km)	Band Combination[b]	Age in 2004[c]	Sex
2003	Stuart Mesa / 271	Pump Road / PHL, PLM & POM	4.8	dgye : Mbr	TY	Male
2003	Vine / 120	Pump Road / PHL	2.2	pupu : Mdg	ASY	Female
2003	Vine / 120 & 108	Bell / BEE & BRS	1.4	reor : Mdg	A4Y	Male
2003	Pueblitos/101	Bell/BNG	2.1	ORPU: none	A4Y	Female
2003	Pump Road / 53	Bell / BLH	2.5	orpu : Mdg	ASY	Male
2003	Bell/3	Ysidora Ponds/MLY	1.0	Mre:orwh	SY	Female
2003	Pueblitos / 102	Pump Road / PRN	0.9	Mre : yeye	SY	Male
2003	Pueblitos/118	Pump Road/PLM	0.8	Mre: oror	SY	Female
2003	Pump Road / 62	Bell / BKM	3.1	Mre : puwh	SY	Female
2003	Guajome, San Luis Rey	Pueblitos / ERN	9.1	redb : Mdg	ASY	Female
2001	Air Station / 2	Pump Road / PRG	1.7	PUPU : Mbr	4Y	Female
2000	Air Station / LC	Pump Road / PRN	1.7	Msi : reye	5Y	Female

[a] Figures 28 and 29 show flycatcher concentration areas.
[b] Band combinations: left leg:right leg; Msi = federal aluminum band, Mdg = anodized green federal band, Mbr = anodized bronze federal band, Mre = anodized red federal band. Celluloid bands: PUPU = purple, ORPU = orange-purple split. Metal bands: pupu = purple, oror = orange, yeye = yellow, dgye = dark green-yellow split, reye = red-yellow split, redb = red-dark blue split, orwh = orange-white split, puwh = purple-white split, reor = red-orange split, orpu = orange-purple split.
[c] Age codes: SY = second year – fledged 2003, TY = third year – fledged 2002, 4Y = fourth year - fledged 2001, 5Y = fifth year – fledged 2000, ASY = after second year - bird is known to be at least three years old, A4Y = after fourth year - bird is known to be at least five years old.

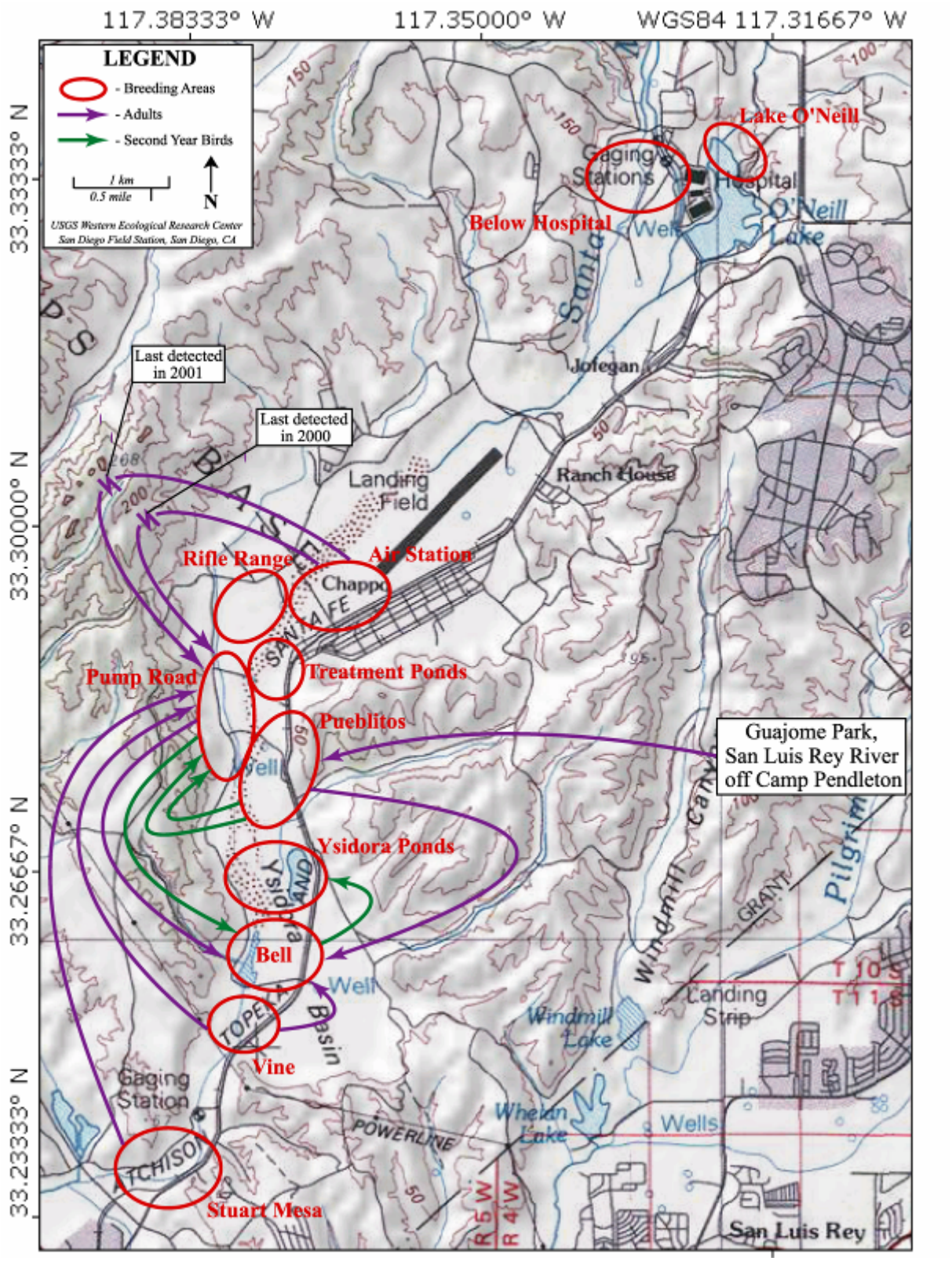

Figure 28. Between-year, between-area movement by adult and second year southwestern willow flycatchers at Marine Corps Base Camp Pendleton, 2004.

Two incidents of movement by adult willow flycatchers within the 2004 season were observed (Table 7 and Figure 29). One male, a returning second year bird banded as a nestling in 2003, was documented as single in territory ARC in the Air Station area at the beginning of the season, and later moved to Pump Road (territory PRN, Figure 18) where he paired and bred. A second male, who spent the majority of the season on Las Flores Creek (territory LUL, Figure 27), moved in late July to territory ARC in the Air Station area, and a few days later to the Pueblitos area near territory EDY (Table 7, Figure 29).

Table 7. Within-year, between-area movement of southwestern willow flycatchers at Marine Corps Base Camp Pendleton in 2004.

Area[a] First Detected	Area Later Detected	Distance Moved (km)	Band Combination[b]	Age[c]	Status	Comments
Above Basilone	Air Station	7.5	Mdg : dbwh	ASY	Single	Movement occurred at end of season.
Air Station	Pueblitos	1.7	Mdg : dbwh	ASY	Single	Same individual as above moved again at end of season.
Air Station	Pump Road	1.6	Mre : yeye	SY	Paired	Movement occurred at beginning of season, bird paired at new location.

[a] Figures 28 and 29 show flycatcher concentration areas.
[b] Band combinations: left leg:right leg; Mdg = anodized green federal band, Mre = anodized red federal band. Metal bands: yeye = yellow, dbwh = dark blue-white split.
[c] Age codes: SY = second year – fledged 2003, ASY = after second year - bird is known to be at least three years old.

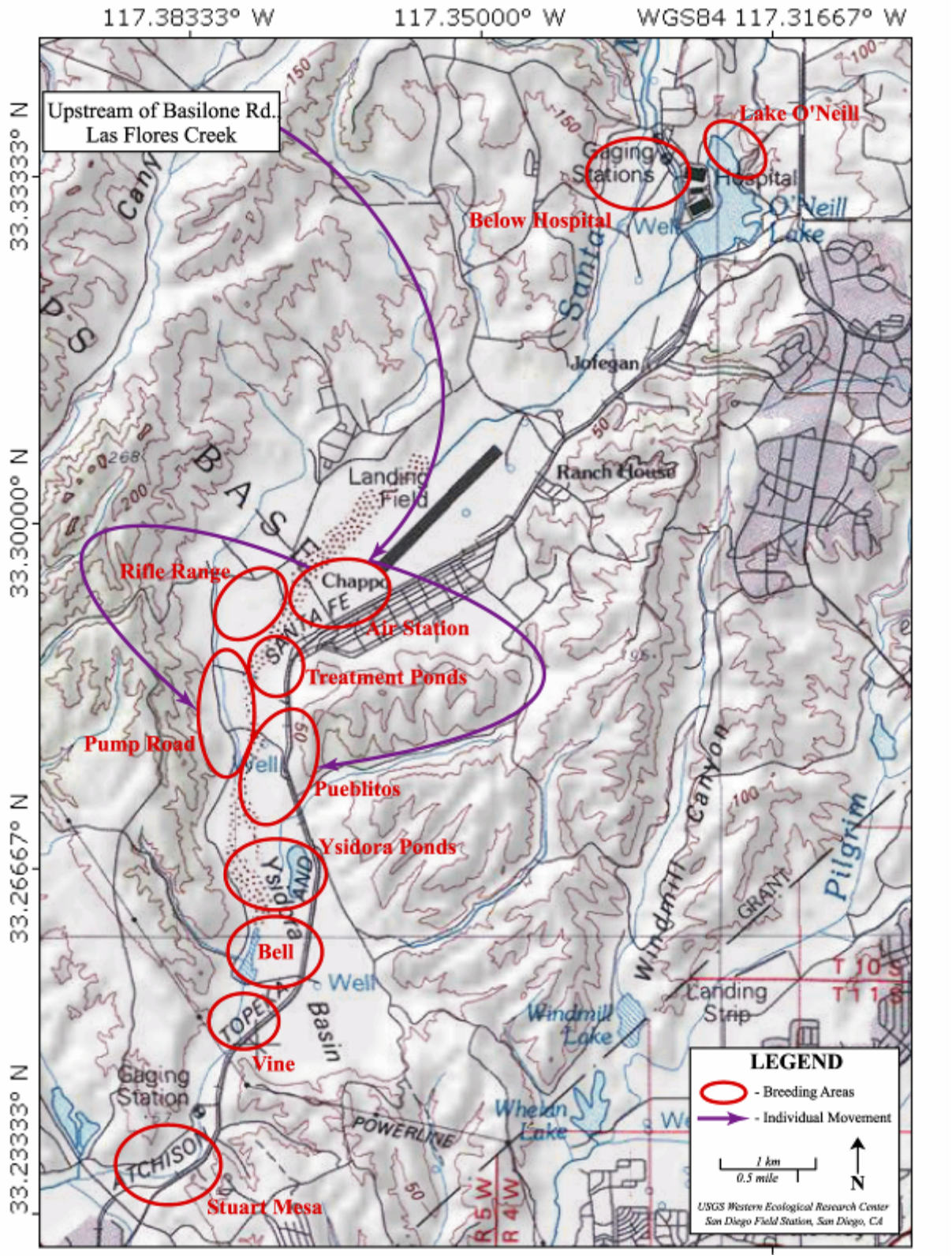

Figure 29. Same-year, between-area movement by southwestern willow flycatchers at Marine Corps Base Camp Pendleton, 2004.

DISCUSSION

Willow flycatcher abundance at Camp Pendleton increased in 2004 relative to the previous year. Transient numbers more than doubled over the 39 birds detected in 2003 (Kus and Kenwood 2005), and approached the highest documented annual count of 102 transients seen in 2002 (Kus and Kenwood 2003). More important to flycatcher recovery, however, is the increase in the breeding population of flycatchers at the Base. Although the total number of resident birds did not change appreciably between 2003 and 2004 (26 and 27 individuals, respectively), the number of breeding pairs increased by 38%, from 16 in 2003 to 22 in 2004, representing the largest breeding population documented on Base since focused monitoring began in 1999 (Griffith and Griffith 2000; Kus 2001; Kus and Ferree 2002; Kus and Kenwood 2003, 2005). The increase in the number of flycatcher pairs is largely the result of increased polygyny, both in terms of the number of polygynous males (four in 2003, five in 2004), and the number of females mated to polygynous males (eight in 2003, 12 in 2004). As in 2003, unpaired males were present in 2004, including both single territorial males and floaters, yet fewer than half (45%) of the females were monogamous, with the rest sharing mates. As a result, only 75% of the males at the Base in 2004 bred, despite the fact that males were outnumbered by females (20 and 22, respectively). The basis for the occurrence of polygyny, and the factors influencing mate selection, continue to warrant further investigation.

Although the breeding flycatcher population grew in 2004, nest success declined relative to 2003, from 68% (17/25) to 52% (16/31). This decline is largely attributable to an increased use of exotic plants as nest hosts, particularly poison hemlock, which is susceptible to collapse as it dries and the stalks weaken. Forty-two percent of nests in 2004 were placed in poison hemlock, compared to 12% in 2003, and of these, at least 31% (4/13) failed as a result of host plant collapse. Host plant collapse accounted for 27% (4/15) of all nest failures, with the rest attributable to predation. Poison hemlock provides a dense understory similar to that created by stands of native stinging nettles and appears to be highly attractive to nesting flycatchers; however, in some years, especially comparatively dry years when vegetation becomes dessicated early in the season, use of poison hemlock has adverse consequences for nest success.

Reduced nest success combined with a lesser extent of re-nesting resulted in lower seasonal productivity of flycatchers in 2004 (1.8 fledglings per pair) than in 2003 (3.0 fledglings per pair). Productivity in 2004 was intermediate to that documented in 2002, an extreme drought year (1.5 fledglings per pair) and 2001 (1.9 fledglings per pair).

Immigration into the Camp Pendleton flycatcher population was documented for the second time since 2002 (Kus and Kenwood 2003), with the movement of an adult female onto the Base from her 2003 breeding location on the San Luis Rey River. Return of birds breeding at Camp Pendleton in 2003 (56%) was comparable to that of birds returning between 2002-2003 (55%), although lower than the 70% that returned between 2001-2002. Recruitment of second year birds fledged at Camp Pendleton in 2003 into the 2004 population (15%, 5/34) was approximately half that documented between 2002-2003 (27%, 3/11). Our observations of color banded birds, like those from other studies (Kenwood and Paxton 2001) reveal gaps in the

annual occurrence of individual birds at the Base, with birds returning to Camp Pendleton after absences of a year or more. This means that annual return rates provide only conservative estimates of survivorship, and that more detailed analysis of data collected over many years will be required to produce estimates of this important demographic parameter. This applies particularly to calculation of survival estimates for juveniles, which are often undetected for two or more years after being banded as nestlings (Kenwood and Paxton 2001).

As in previous years, approximately one-third of returning flycatchers changed breeding locations at the Base between 2003 and 2004. In addition, birds changed territory locations during the 2004 season; in one instance, the move resulted in a single male obtaining a mate at the new location. Continuing investigation of movement patterns and their relationship to breeding status, mate selection and population genetic structure should advance our understanding of local and regional flycatcher population dynamics.

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APPENDIX 1

Band combinations and identification of southwestern willow flycatcher nestlings banded on Marine Corps Base Camp Pendleton in 2004.

Territory ID	Nest ID	Nestling Band Combination[a]	Federal Band Number
ARC	A	Msi : none	237003223
BEE	A	Msi : none	204089754
BEE	A	Msi : none	204089755
BEE	A	Msi : none	204089756
BEE	A	Msi : none	204089757
BLH	A	Msi : none	204089765
BLH	A	Msi : none	204089766
BNG	A	Msi : none	204089758
BRS	A	Msi : none	237003221
BRS	A	Msi : none	237003222
BTY	A	Msi : none	237003213
BTY	A	Msi : none	237003214
BTY	A	Msi : none	237003215
EDY	A	Msi : none	204089760
EDY	A	Msi : none	204089762
EDY	A	Msi : none	204089763
EDY	B	Msi : none	237003224
EDY	B	Msi : none	237003225
EDY	B	Msi : none	237003226
EDY	B	Msi : none	237003227
END	A	Msi : none	237003220
ERN	A	Msi : none	237003208
ERN	A	Msi : none	237003209
MPS	C	Msi : none	237003210
MPS	C	Msi : none	237003211
MPS	C	Msi : none	237003212
PHL	A	Msi : none	228058422
PHL	A	Msi : none	228058423
PHL	A	Msi : none	228058424
PIT	C	Msi : none	228058435
PIT	C	Msi : none	228058436
PIT	C	Msi : none	228058437
PLM	A	Msi : none	228058432
PLM	A	Msi : none	228058433
PLM	A	Msi : none	228058434
POM	A	Msi : none	228058426
POM	A	Msi : none	228058427
PRG	A	Msi : none	204089767
PRG	A	Msi : none	228058430
PRG	A	Msi : none	228058431
PRN	B	Msi : none	228058438
PRN	B	Msi : none	228058439

[a] Band combinations: left leg : right leg; Msi = federal aluminum band, none = no bands present.